Fisheries and Oceans
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Atlas of Physical Oceanographic Data for the South Atlantic Ocean, Drake Passage, Pacific Ocean, and Canadian Arctic-1970

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Canadian Technical Report of Hydrography and Ocean Sciences

These reports contain scientific and technical information of a type that represents a contribution to existing knowledge but which is not normally found in the primary literature. The subject matter is generally related to programs and interests of the Ocean Science and Surveys (OSS) sector of the Department of Fisheries and Oceans.

Technical Reports may be cited as full publications. The correct citation appears above the abstract of each report. Each report will be abstracted in Aquatic Sciences and Fisheries Abstracts. Reports are also listed in the Department's annual index to scientific and technical publications.

Technical Reports are produced regionally but are numbered and indexed nationally. Requests for individual reports will be fulfilled by the issuing establishment listed on the front cover and title page. Out of stock reports will be supplied for a fee by commercial agents.

Regional and headquarters establishments of Ocean Science and Surveys ceased publication of their various report series as of December 1981. A complete listing of these publications and the last number issued under each title are published in the *Canadian Journal of Fisheries and Aquatic Sciences*, Volume 38: Index to Publications 1981. The current series began with Report Number 1 in January 1982.

Rapport technique canadien sur l'hydrographie et les sciences océaniques

Ces rapports contiennent des renseignements scientifiques et techniques qui constituent une contribution aux connaissances actuelles mais que l'on ne trouve pas normalement dans les revues scientifiques. Le sujet est généralement rattaché aux programmes et intérêts du service des Sciences et Levés océaniques (SLO) du ministère des Pêches et des Océans.

Les rapports techniques peuvent être considérés comme des publications à part entière. Le titre exact figure au-dessus du résumé du chaque rapport. Les résumés des rapports seront publiés dans la revue Résumés des sciences aquatiques et halieutiques et les titres figureront dans l'index annuel des publications scientifiques et techniques du Ministère.

Les rapports techniques sont produits à l'échelon régional mais sont numérotés et placés dans l'index à l'échelon national. Les demandes de rapports seront satisfaites par l'établissement auteur dont le nom figure sur la couverture et la page de titre. Les rapports épuisés seront fournis contre rétribution par des agents commerciaux.

Les établissements des Sciences et Levés océaniques dans les régions et à l'administration centrale ont cessé de publier leurs diverses séries de rapports depuis décembre 1981. Vous trouverez dans l'index des publications du volume 38 du *Journal canadien des sciences halieutiques et aquatiques*, la liste de ces publications ainsi que le dernier numéro paru dans chaque catégorie. La nouvelle série a commencé avec la publication du Rapport n° 1 en janvier 1982.

Canadian Technical Report of

Hydrography and Ocean Sciences 14

November 1982

ATLAS OF PHYSICAL OCEANOGRAPHIC DATA FOR THE SOUTH ATLANTIC OCEAN, DRAKE PASSAGE, PACIFIC OCEAN, AND CANADIAN ARCTIC - 1970

by

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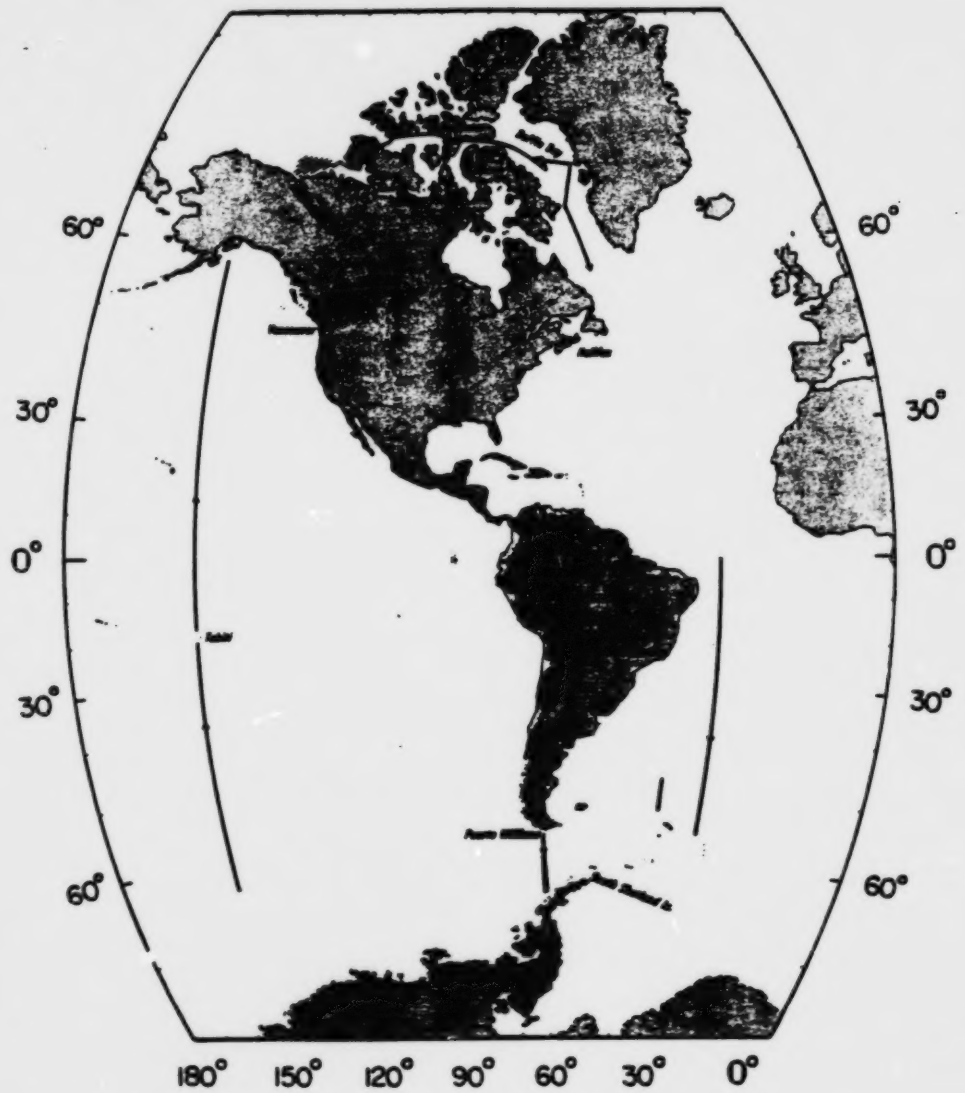
EXPEDITION HUDSON 70 EXPEDITION



CIRCUMNAVIGATION OF THE AMERICA'S

"CSS HUDSON"

NOVEMBER 19 1969 – OCTOBER 16 1970

ABSTRACT

Bellefontaine, L., Pritchard, J., and Reiniger, R. 1982. Atlas of physical oceanographic data for the South Atlantic Ocean, Drake Passage, Pacific Ocean, and Canadian Arctic - 1970. Can. Tech. Rep. Hydrogr. Ocean Sci. 14: [illegible] p.

Physical oceanographic data gathered in the South Atlantic, Drake Passage, Pacific Ocean, Western and Eastern Arctic and Arctic waters from November 19, 1969, to October 16, 1970, are presented as vertical sections. Data from current meters moored in Drake Passage from January 1970 to February 1970 are presented in various graphical displays including time series, progressive vector, and stick plots.

[illegible]

Bellefontaine, L., Pritchard, J., and Reiniger, R. 1982. Atlas of physical oceanographic data for the South Atlantic Ocean, Drake Passage, Pacific Ocean, and Canadian Arctic - 1970. Can. Tech. Rep. Hydrogr. Ocean Sci. 14: [illegible] p.

Présentation en sections verticales de données recueillies dans l'Atlantique Sud, le Détroit de Drake, l'océan Pacifique, l'Ouest et l'Est de l'Arctique et les eaux de l'Arctique, du 19 novembre 1969 au 16 octobre 1970.

On présente les données obtenues de courantographes amarrés dans le Détroit de Drake en janvier et février 1970 sous diverses formes graphiques, dont des séries chronologiques, des diagrammes de vecteurs progressifs et de vecteurs sous forme de bâtonnets.

ACKNOWLEDGEMENTS

The data presented in this atlas were gathered during the "HUDSON 70" cruise, which was led and co-ordinated by Dr. C.R. Mann. The authors wish to thank the staff of the Ocean Circulation Division, who took part in the data collection, also the personnal of both Ocean Circulation and Coastal Oceanography Data Processing Units who assisted in the analysis. We also acknowledge the contributions of Planssearch Inc. of Dartmouth, Nova Scotia under contract FP806-0-F095 for the preparation and drafting of the major part of the atlas.

PREFACE

INTRODUCTION

This publication contains prepared material derived from data collected during the voyage of the CSS HUDSON from Nov. 19, 1969 to Oct. 16, 1970. The voyage which involved circumnavigating both N. & S. America is known generally as 'HUDSON 70'.

The data is presented in two parts, firstly, selected sections of temperature, salinity, dissolved oxygen, and nutrients, and secondly, current meter data from Drake Passage during January and February 1970.

All the physical oceanographic data presented in this atlas are archived by the Marine Environment Data Service (MEDS) Department of Fisheries and Oceans, Ottawa, except the current meter data which are available from the Atlantic Oceanographic Laboratory.

This atlas does not represent the entire data collection from this cruise.

BOTTOM PROFILES

A precision graphic recorder was operated more or less continuously on the cruise, and bottom profiles have been drawn on most of the sections. The soundings were corrected using Mathews Tables, and are archived by the Oceanic Bathymetry and GEBCO Unit, Dept. of Environment, Ottawa.

For sections where no continuous positioning and/or soundings were available, only soundings at the stations are used, which in some instances are connected by a single line.

TEMPERATURE

All temperatures are expressed in degrees Celsius. Those at the surface were obtained by collecting a sample of water in a metal bucket and measuring its temperature with a mercury-in-glass thermometer accurate to ±0.1°C. Subsurface temperatures were measured with Richter and Wiese or Yoshino reversing thermometers. They are considered accurate to ±0.02°C.

SALINITY

Salinity determinations were made with an "Auto-Lab" inductive salinometer. They are considered accurate to ± 0.004°/... The salinities were calculated using the UNESCO (1966) tables.

OXYGEN

Dissolved oxygen content was determined by the Carpenter modification of the Winkler method using 60 ml sample bottles. The precision of the measurement are estimated to be ±0.06 ml/l.

NUTRIENTS

The nutrient components of sea water; silicate, nitrate and phosphate were determined by continuous flow analysis using a Technicon Auto Analyzer I. The methods used and statistical data for this cruise are described in Automatic Analysis at Sea (Coote, Dunstall and Hiltz, 1971)*. The coefficient of variation was 0.6% for a single silicate determination and 6% for phosphate determination derived from varied CSK standards. The precision for nitrate though not determined would have been between those values.

* Coote A.R., I.W. Dunstall and R.S. Hiltz. 1971. Automated Analysis at Sea. In Technicon International Congress 1970 Volume III, Industrial Analysis & Thurman Associates, Suite 1610, Congress Bldg., Miami, Florida, 33132.

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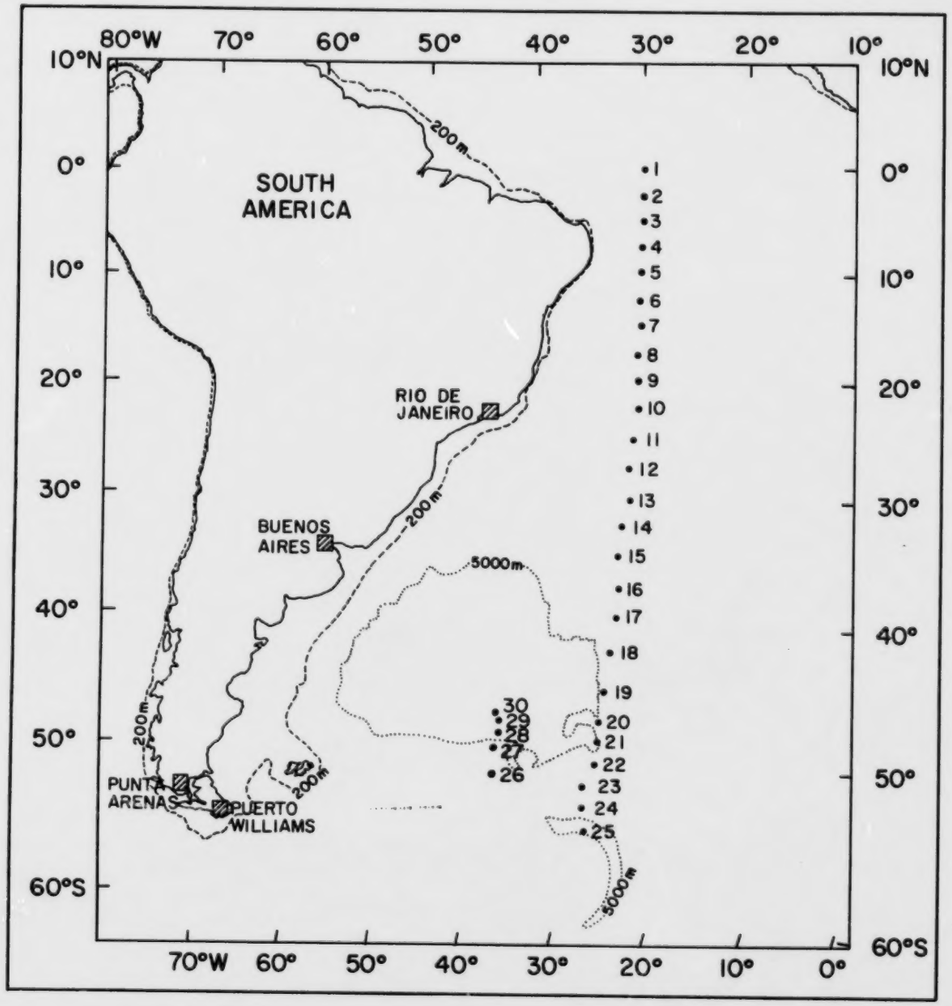
SECTION LOCATION	STATION NUMBERING	TEMPERATURE	SALINITY	DISSOLVED OXYGEN	SILICATE	PHOSPHATE	NITRATE
SOUTH ATLANTIC	1-25	X	X	X	X	X	X
SOUTH ATLANTIC	30-26	X	X	X	X	X	X
DRAKE PASSAGE	38-35	X	X	X	X		X
S. & N. PACIFIC	227-249	X	X	X	X	X	X
BEAUFORT SEA	251-255	X	X				
BEAUFORT SEA	259-258	X	X				
BEAUFORT SEA	263-262	X	X				
ARCTIC SECTION	251-295	X	X				
BARROW STRAIT	285-289	X	X				
DAVIS STRAIT	295-301	X	X				

A summary indicating the sections for which data was collected and is presented in this publication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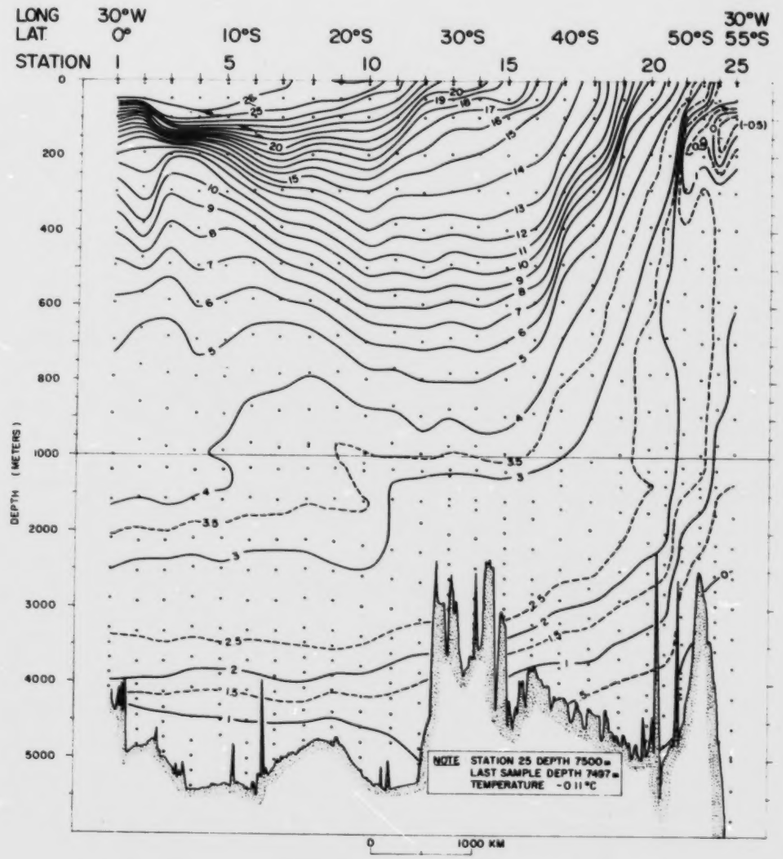

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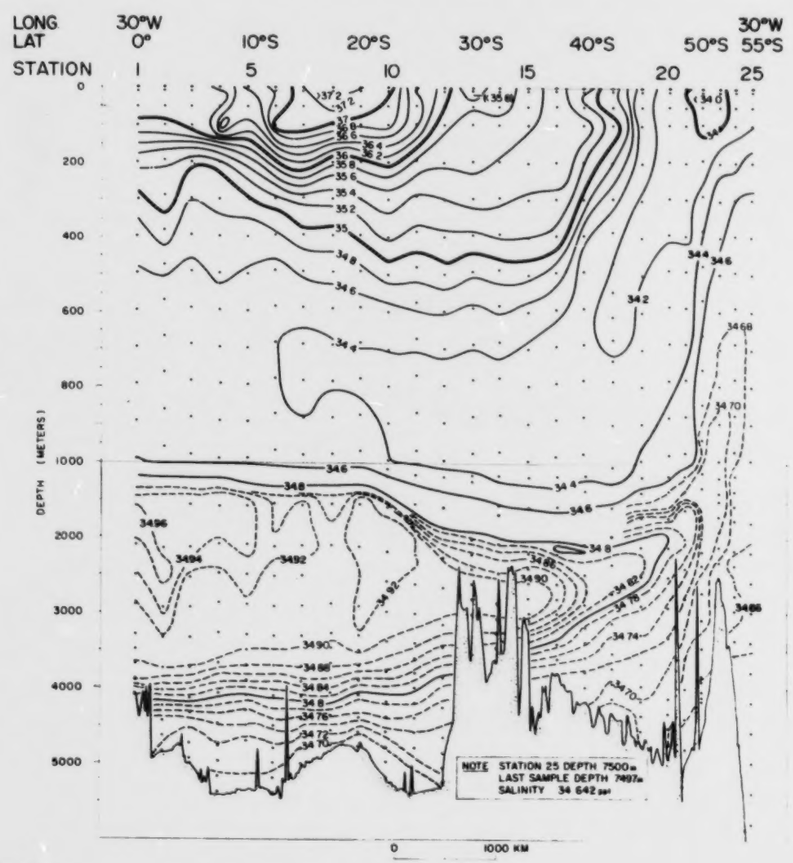

SALINITY (ppt)

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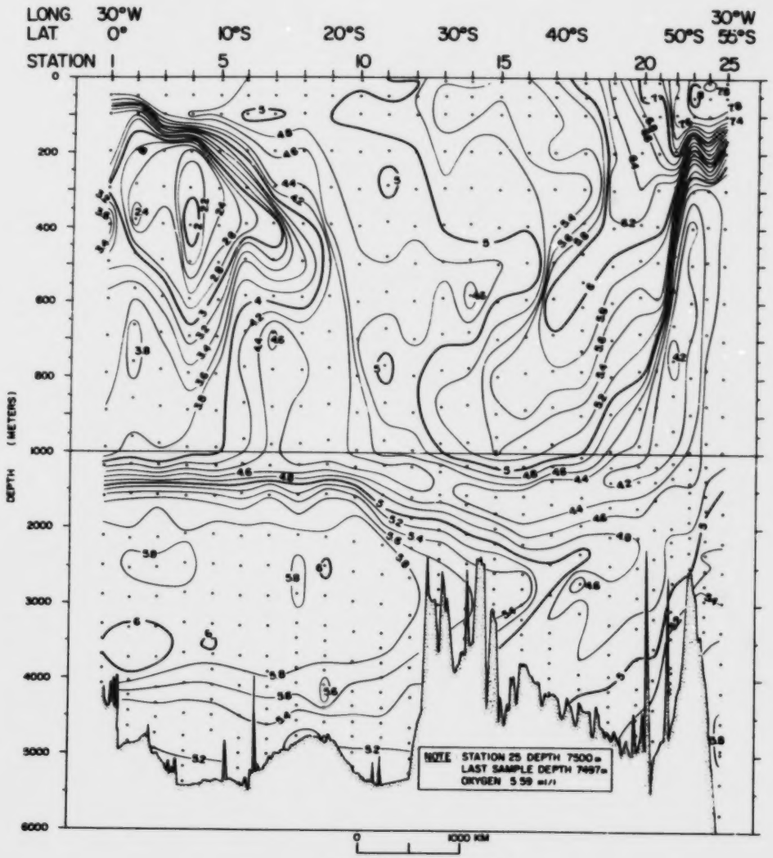

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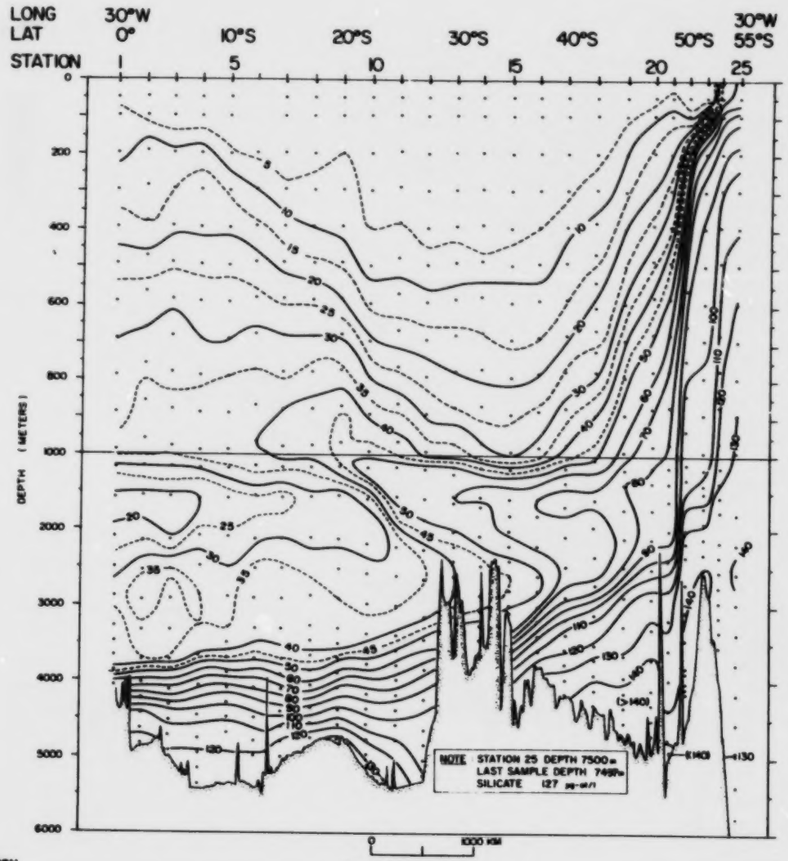

SILICATE (µg - at / l)

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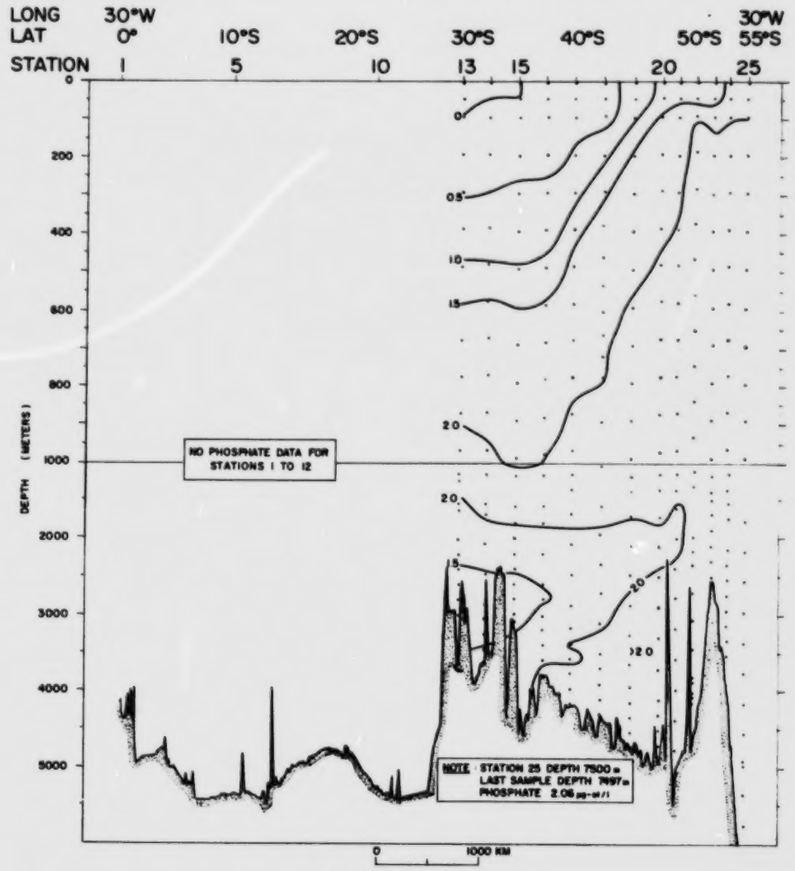

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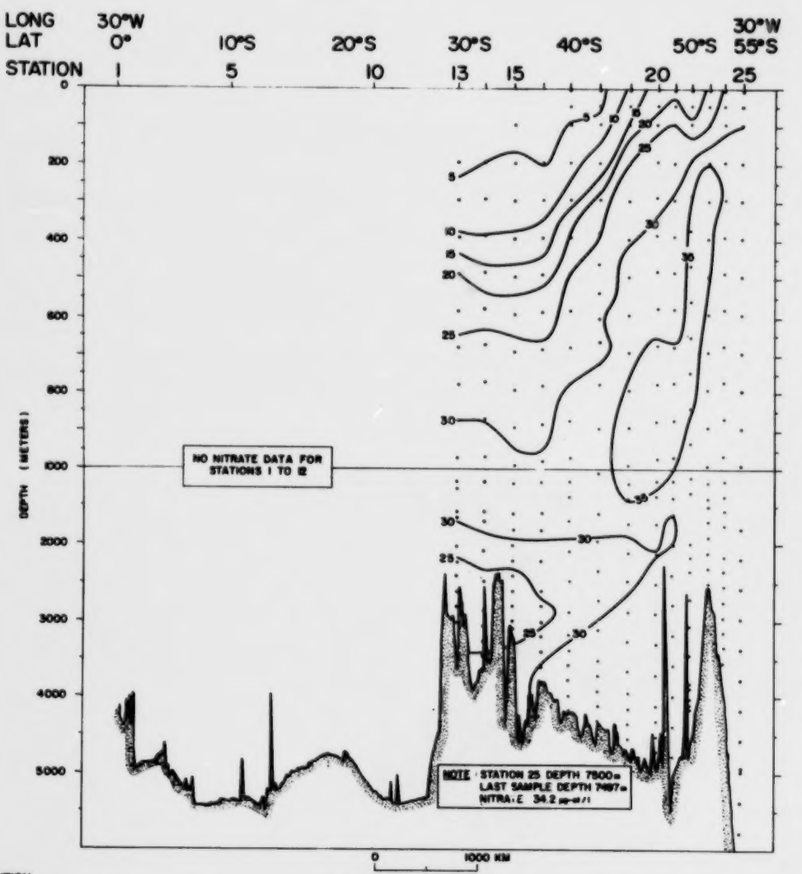

NITRATE (µg-at/l)

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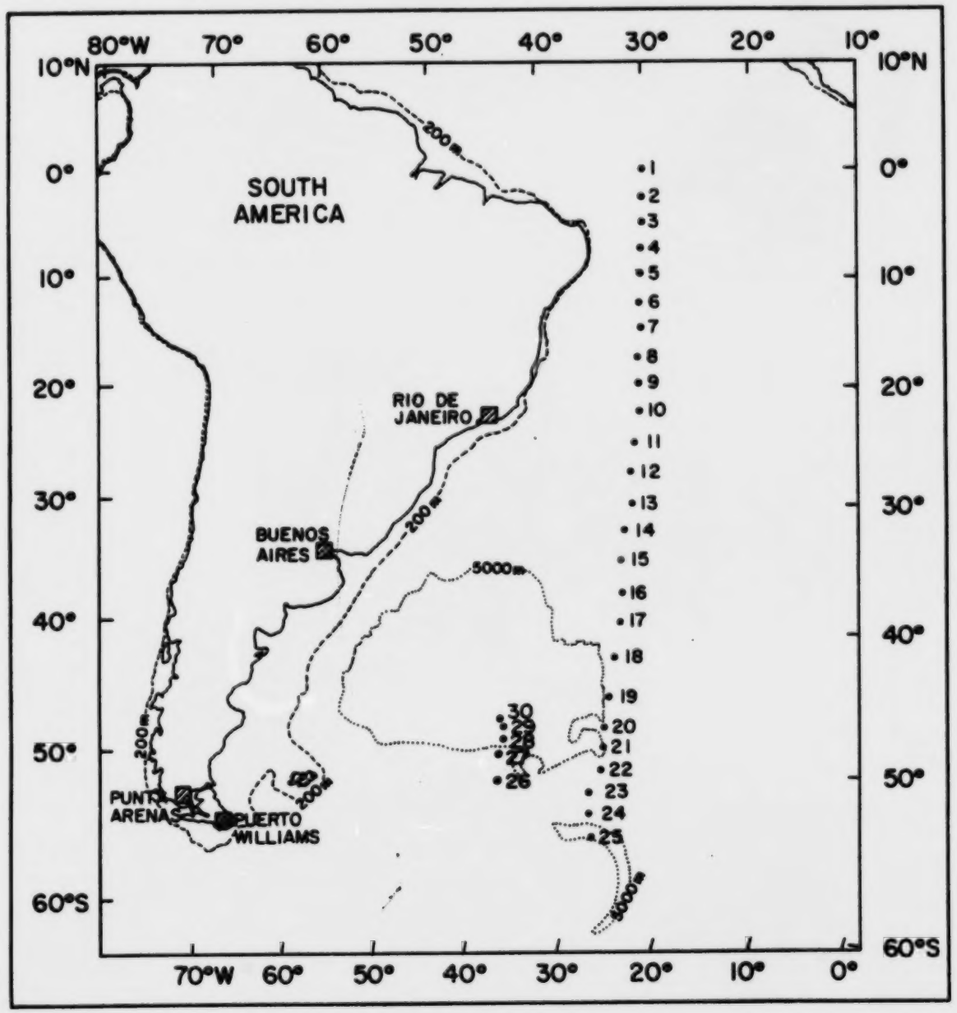
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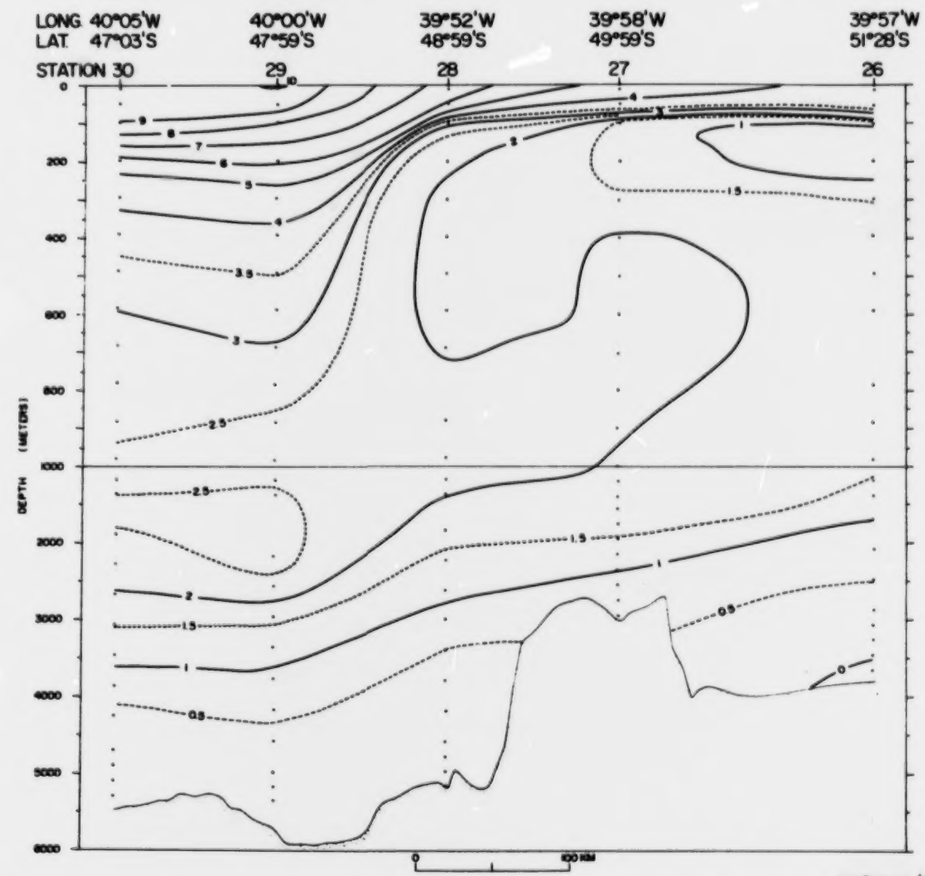

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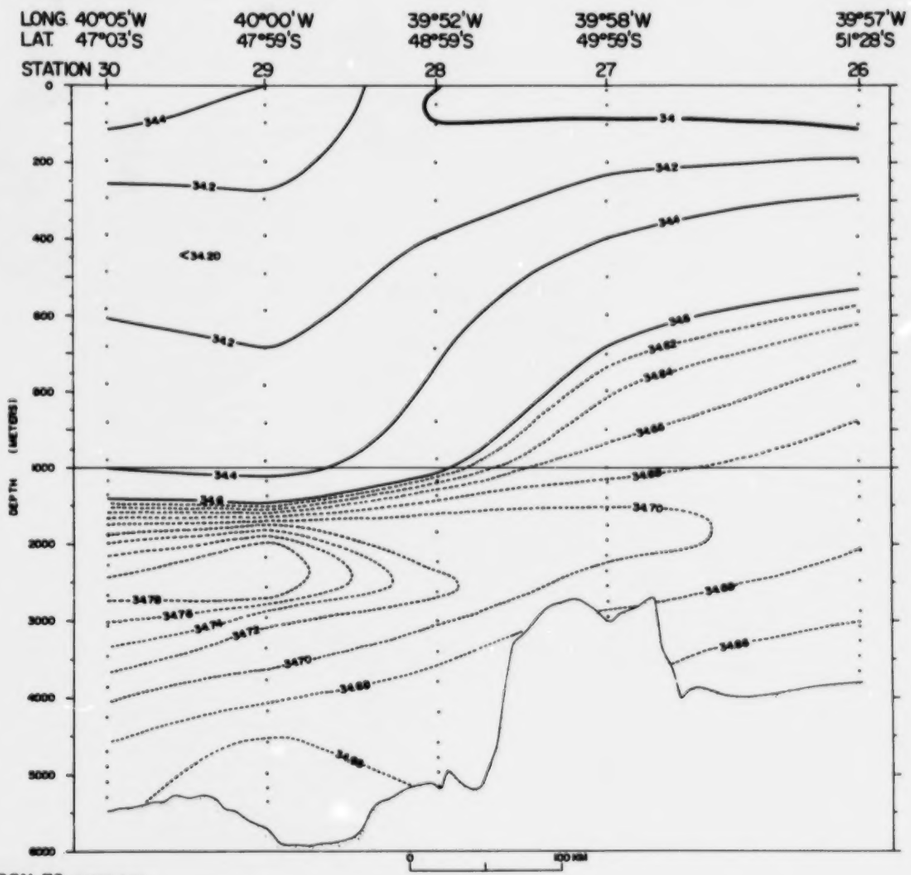

SALINITY (ppt)

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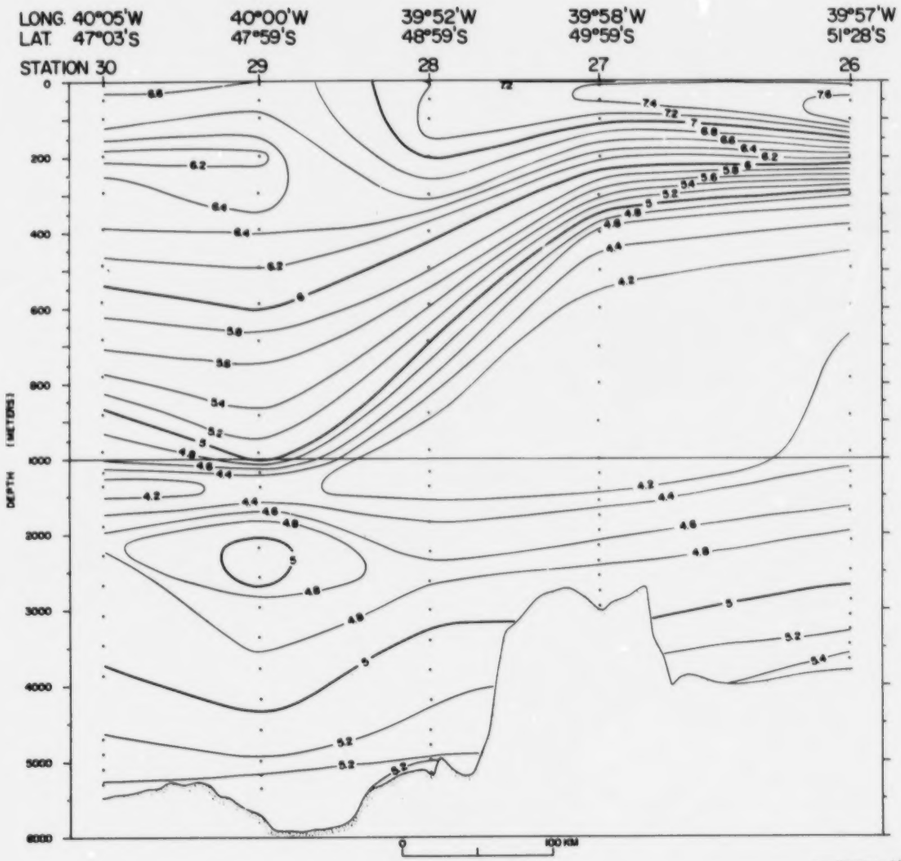

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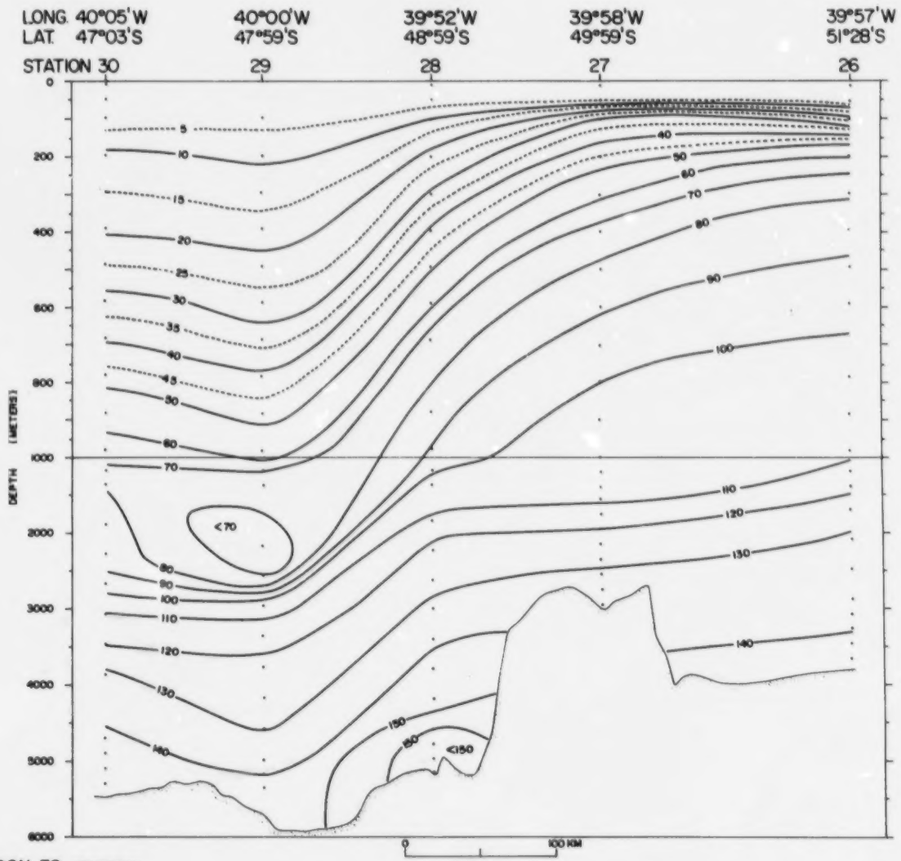

SILICATE (µg-at/l)

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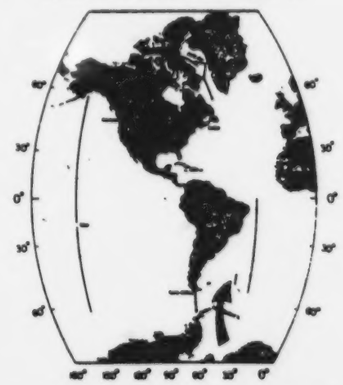

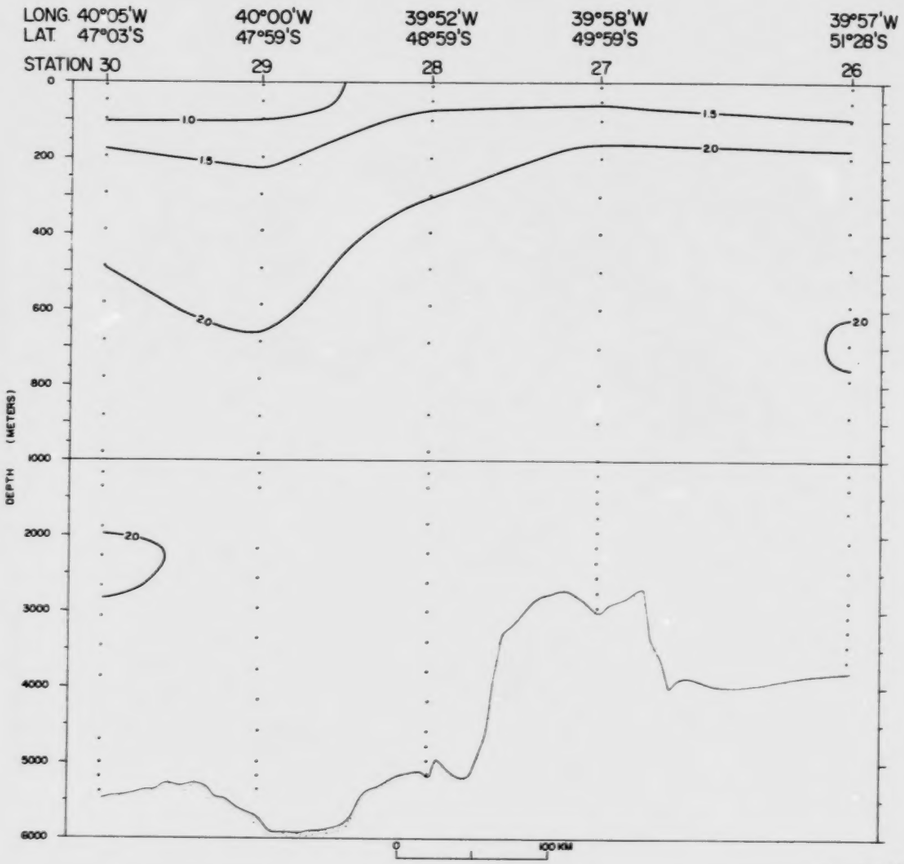

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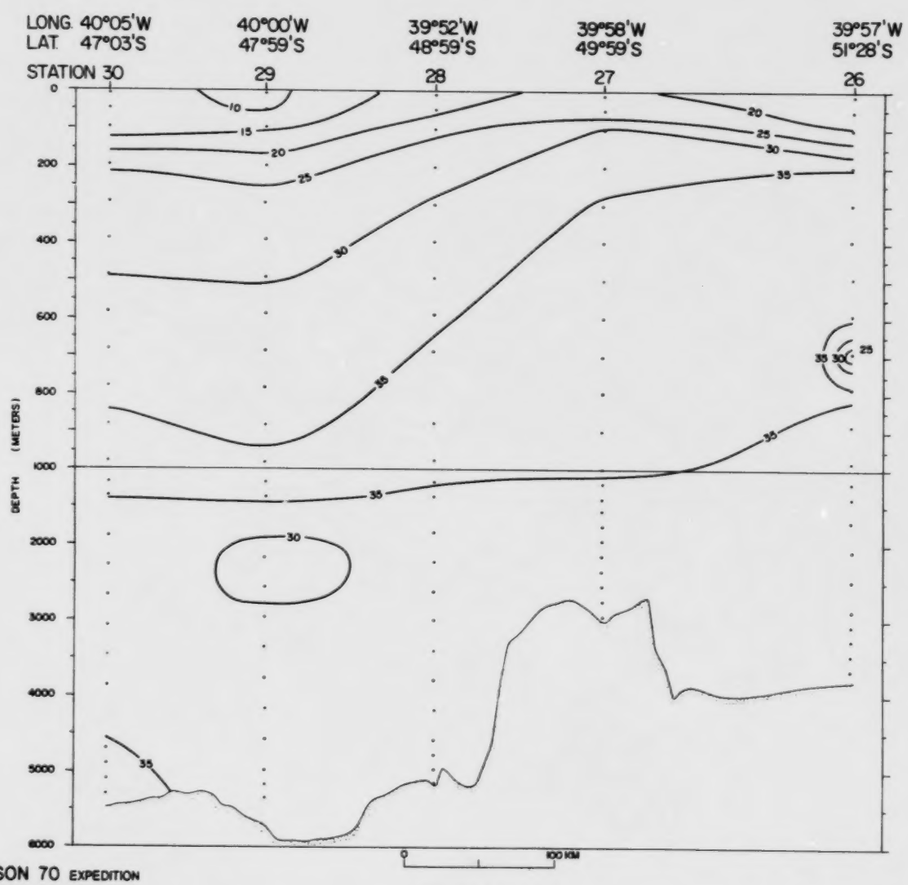

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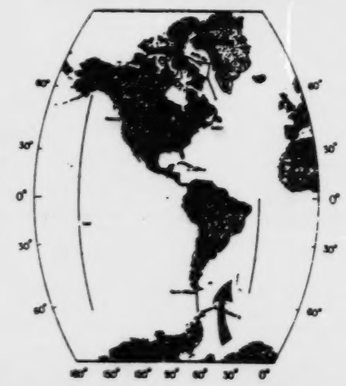

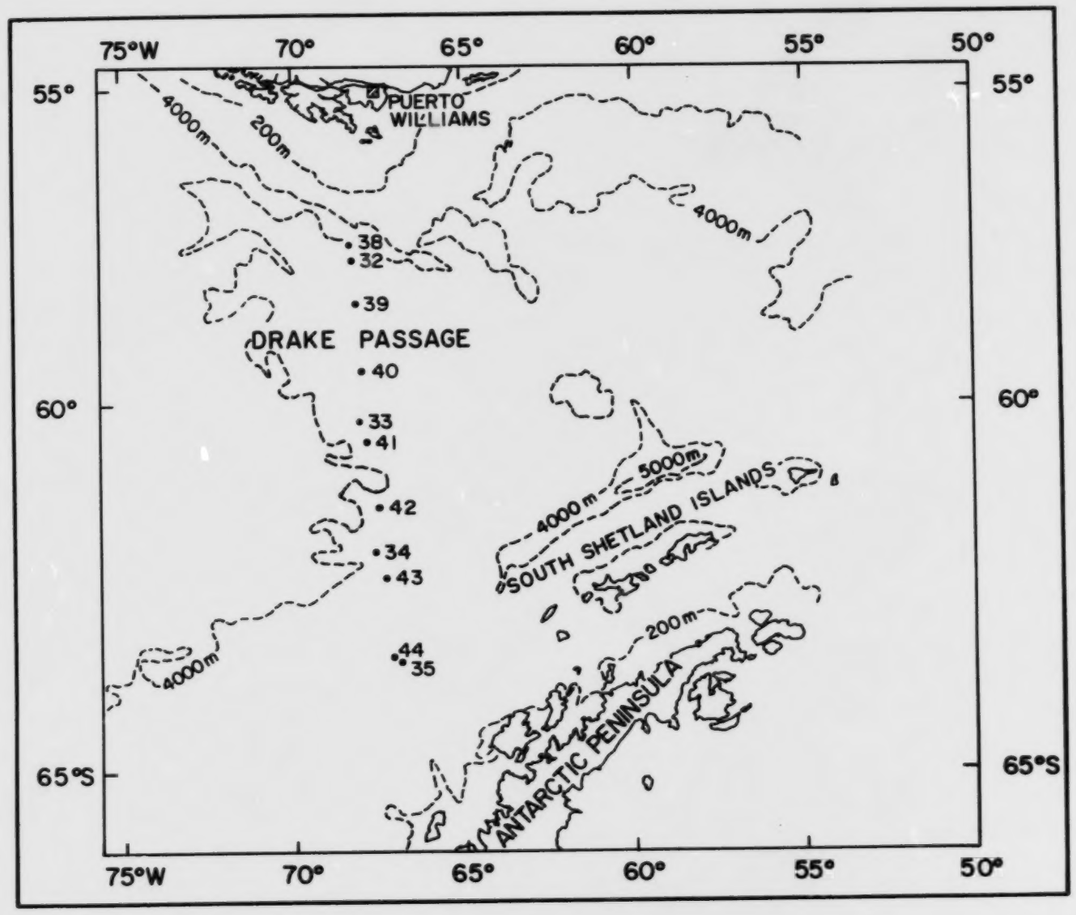
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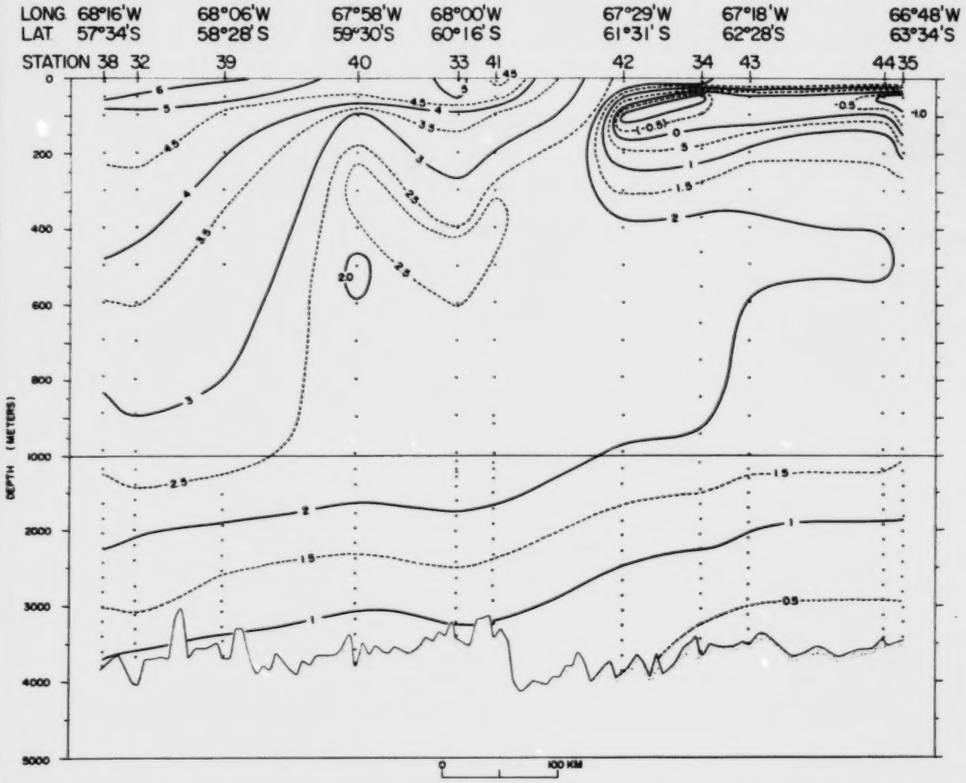

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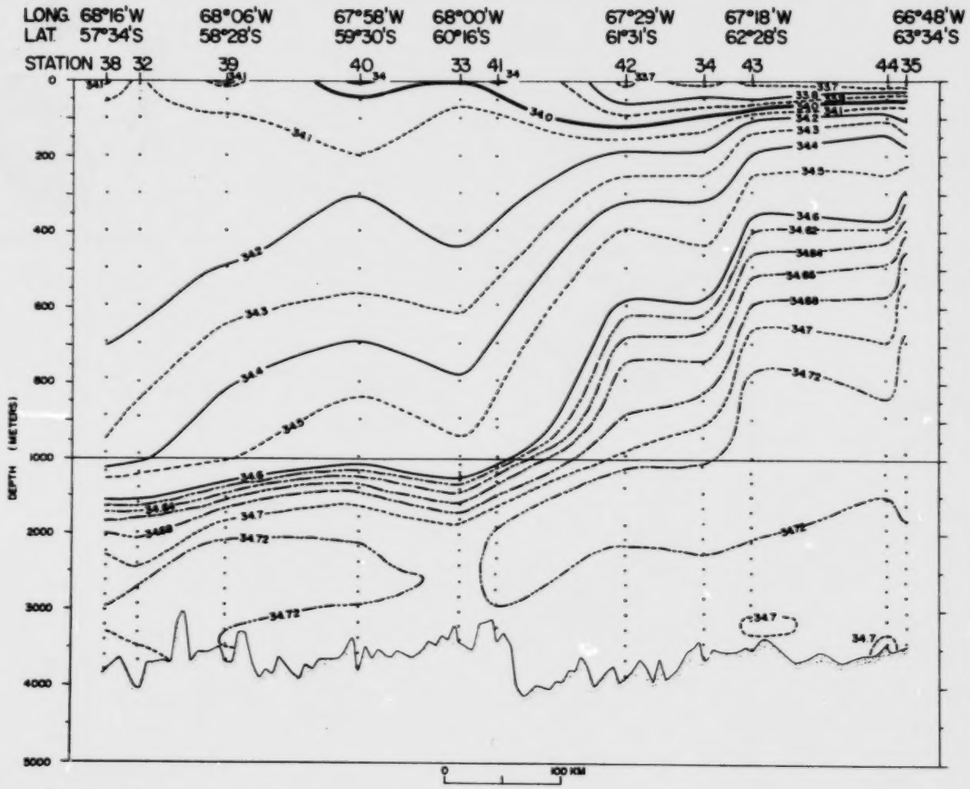

SALINITY (ppt)

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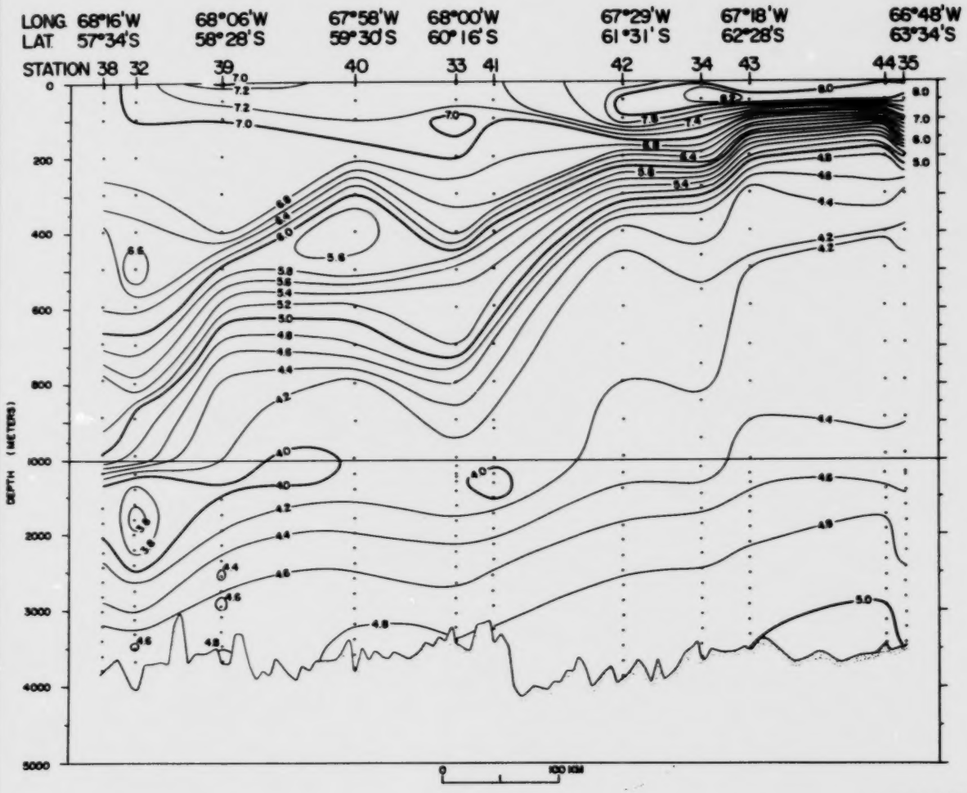

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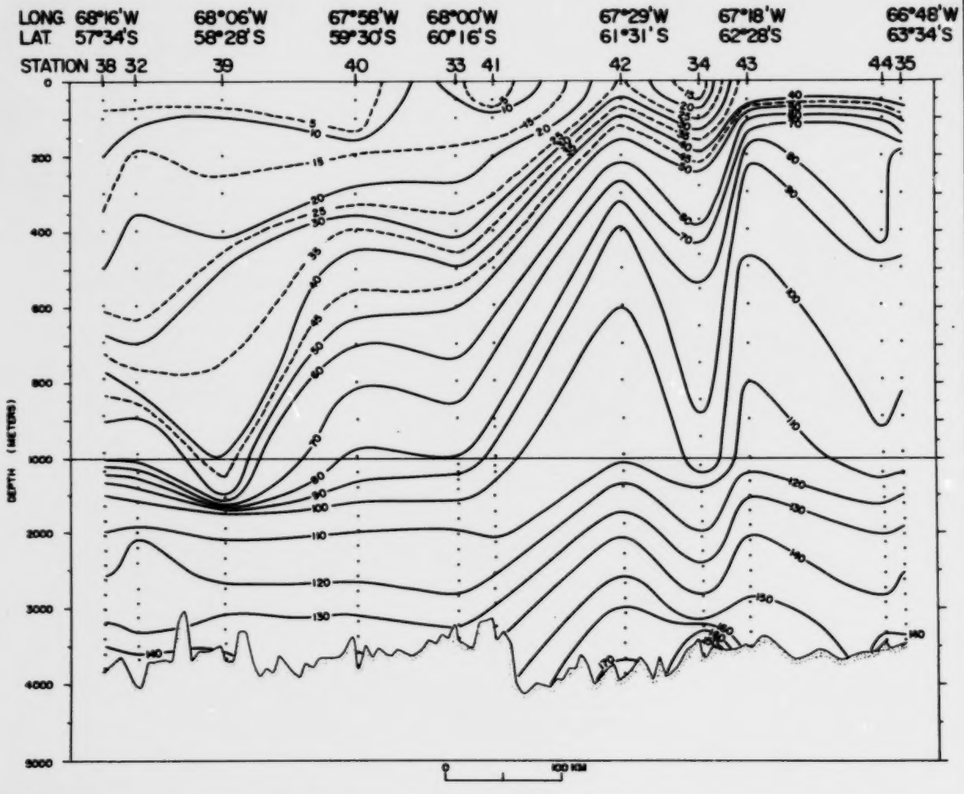

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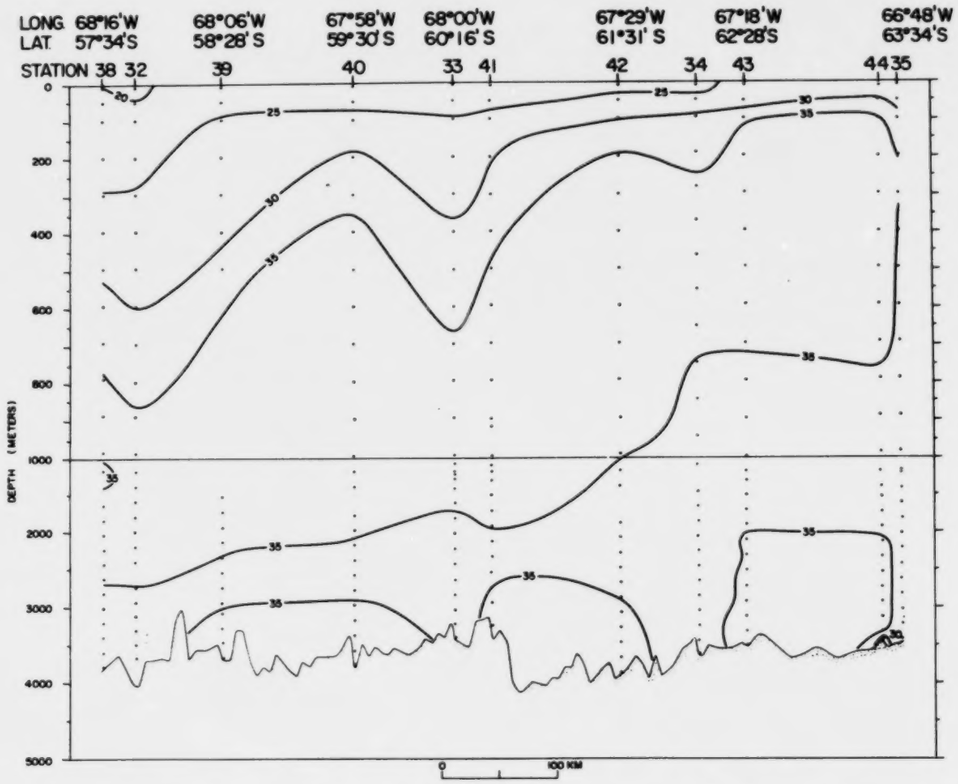

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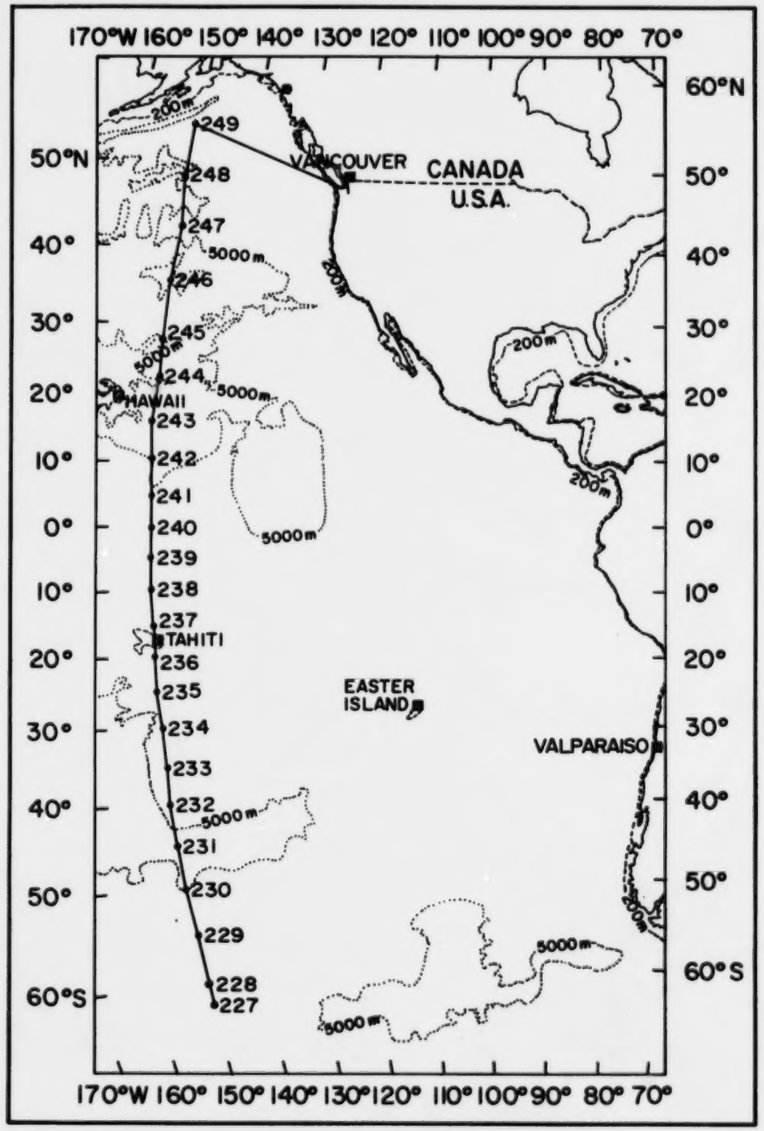
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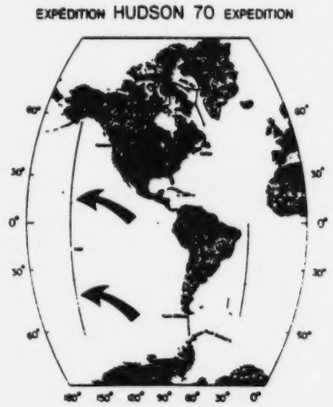
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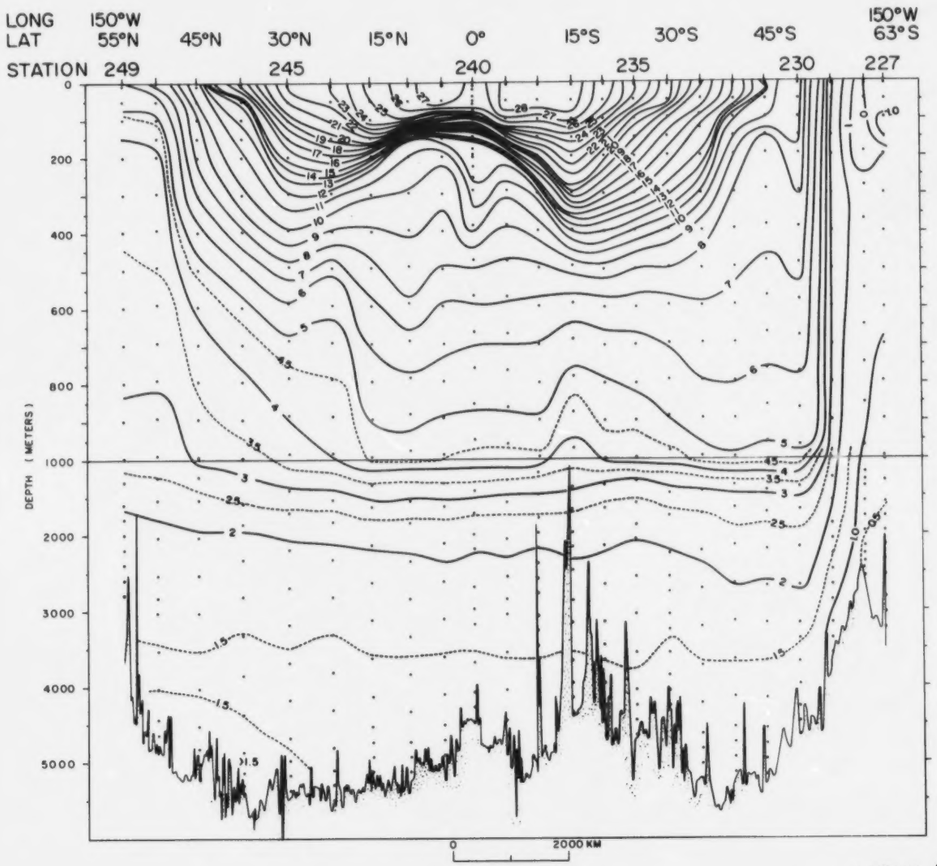
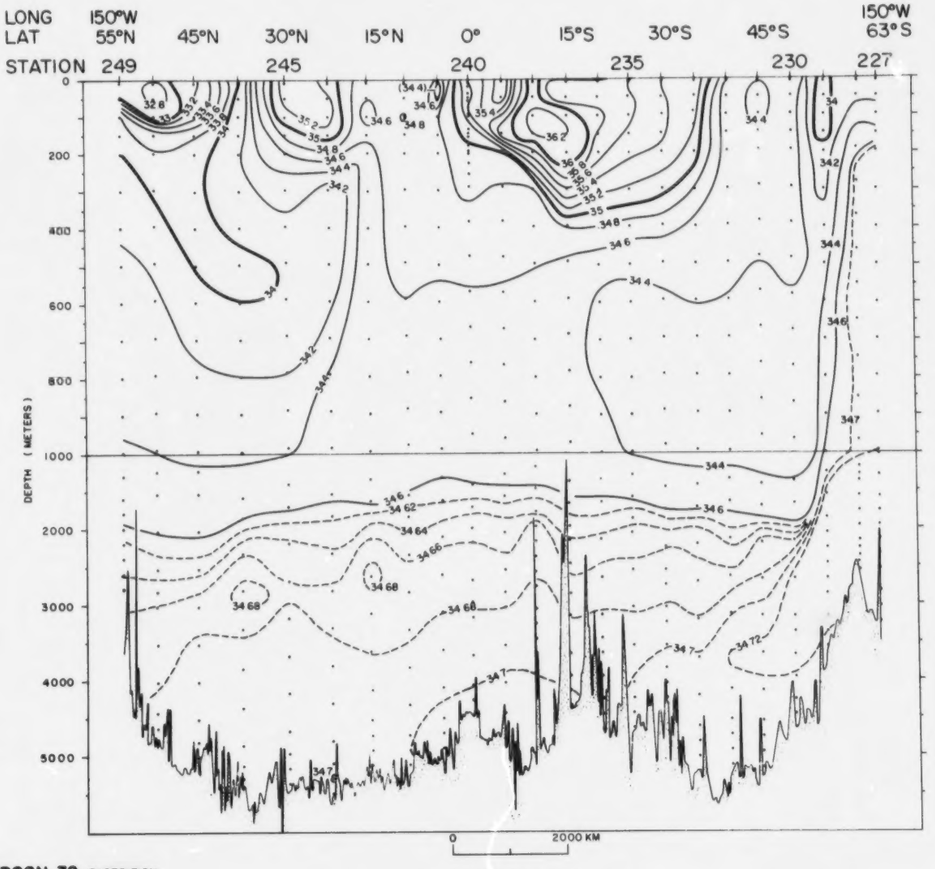
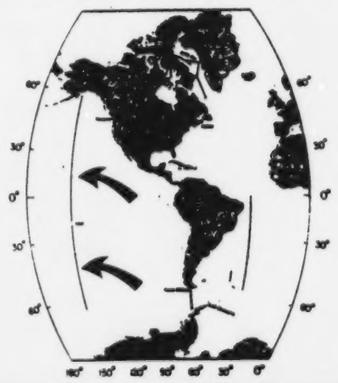


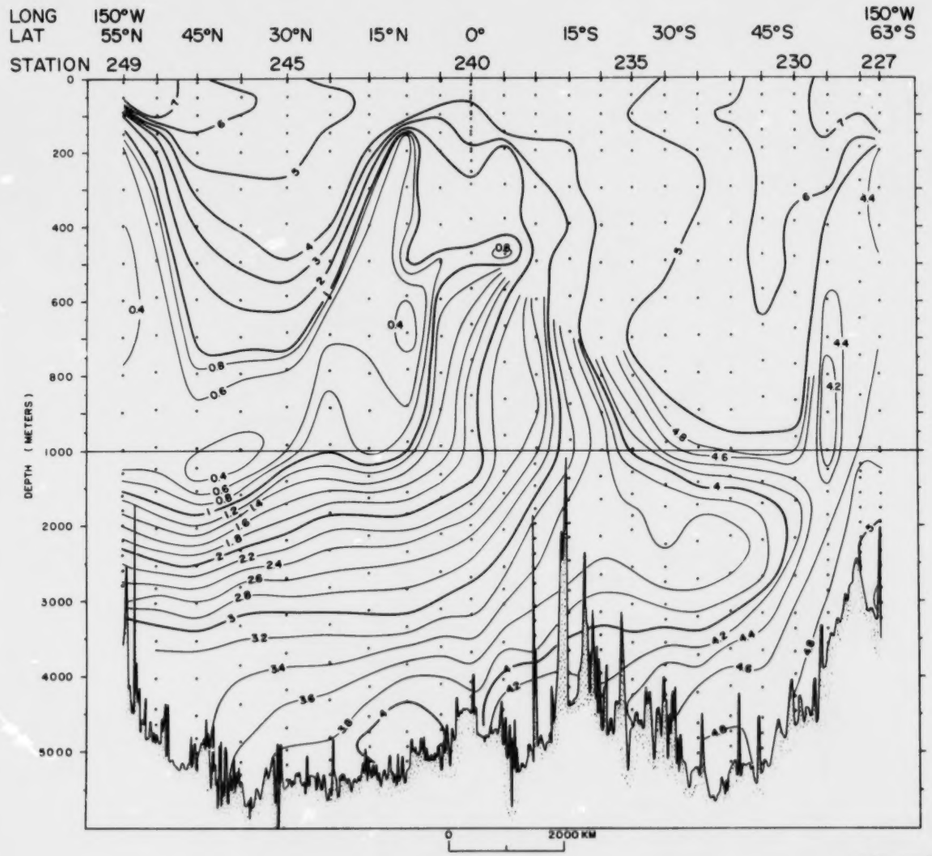
TEMPERATURE (°C)



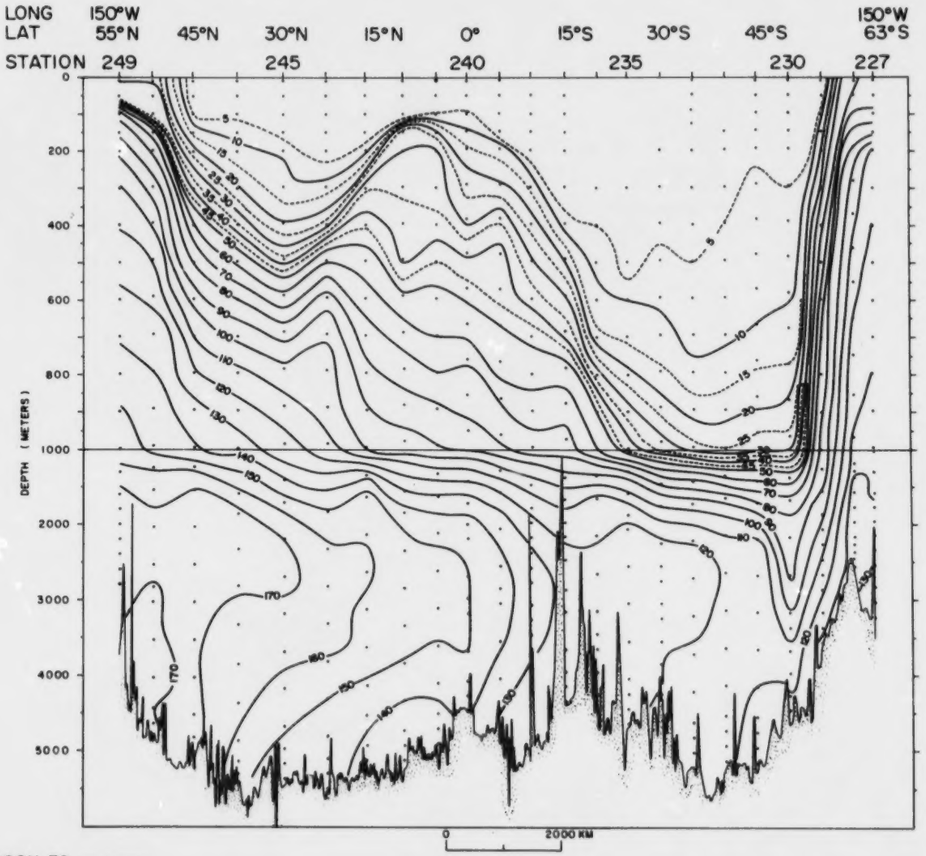
SALINITY (ppt)

EXPEDITION HUDSON 70 EXPEDITION



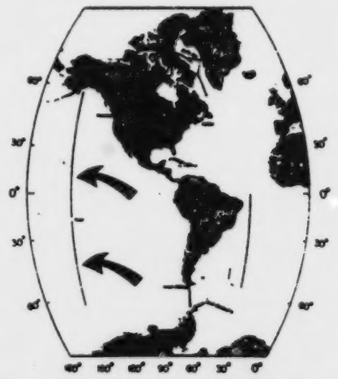


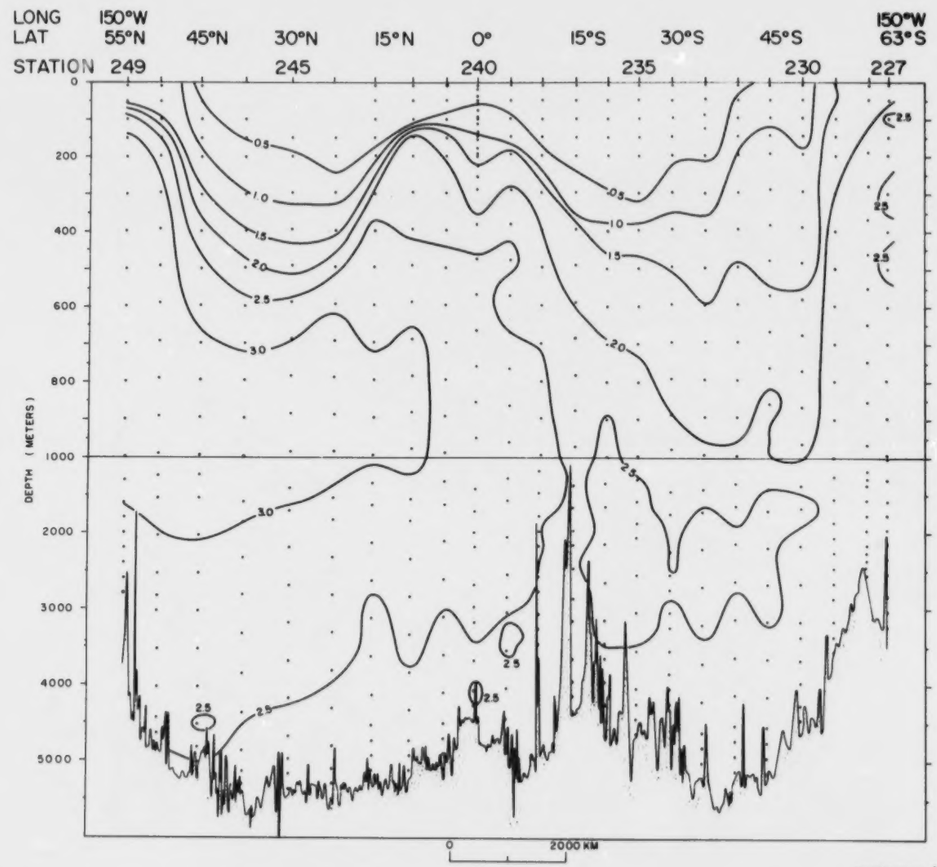
OXYGEN (ml/l)



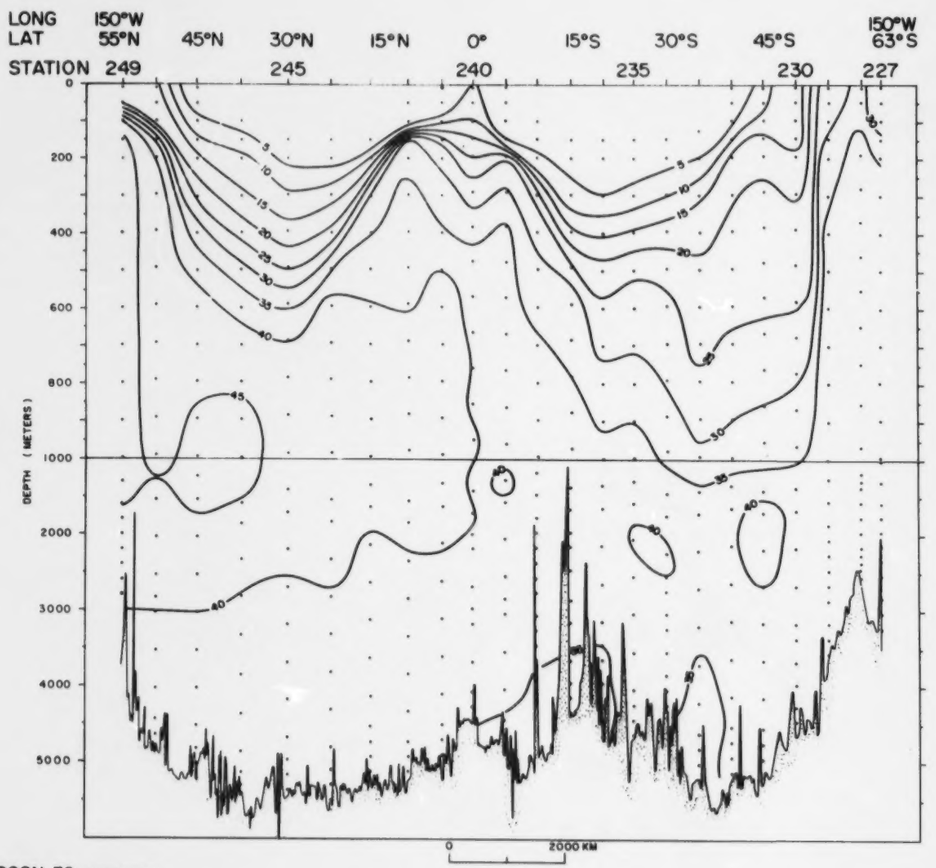
SILICATE (µg-at/l)

EXPEDITION HUDSON 70 EXPEDITION



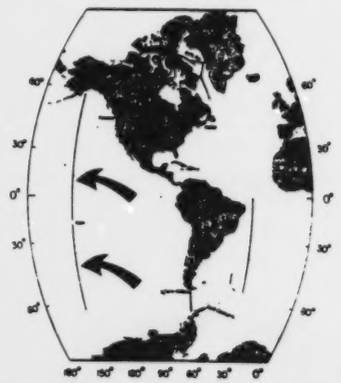


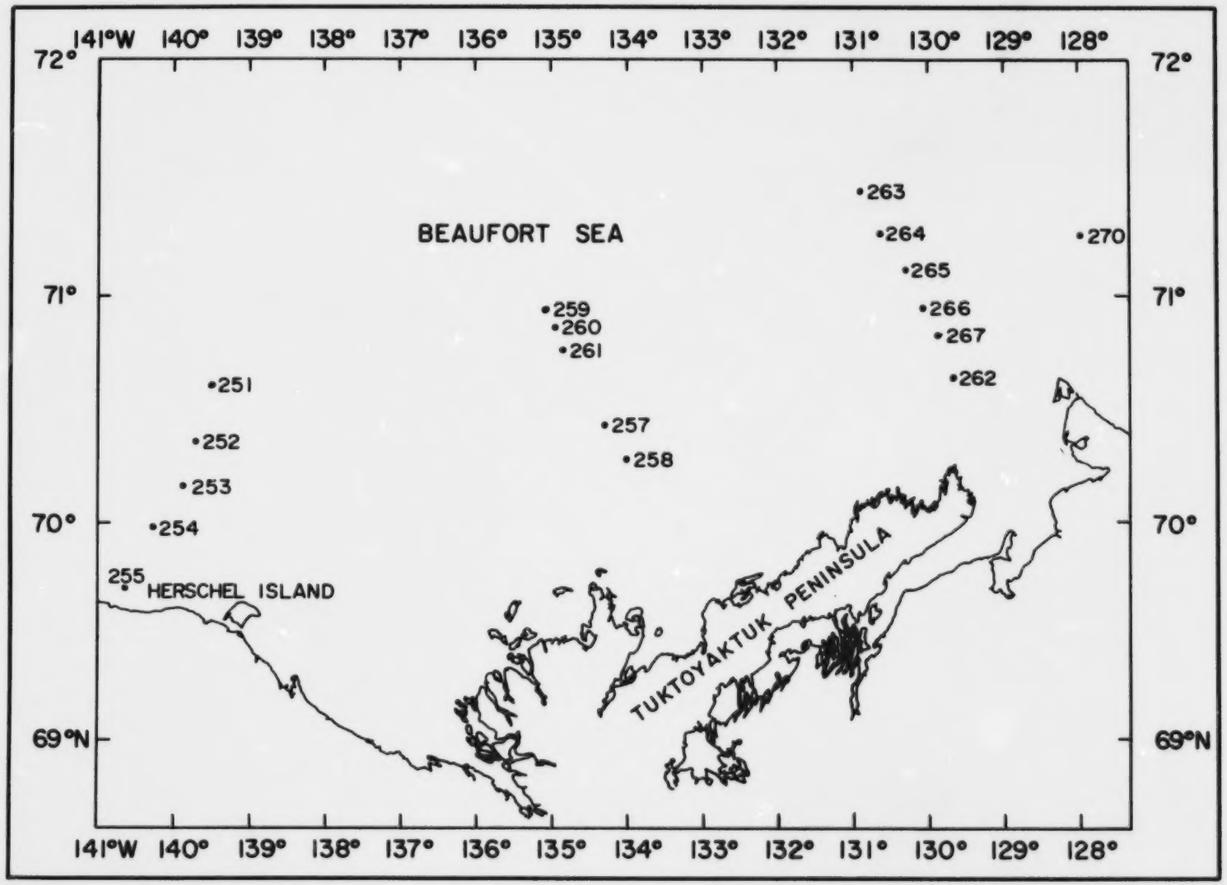
PHOSPHATE (µg-at/l)

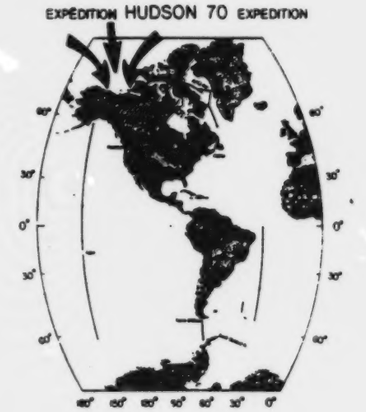


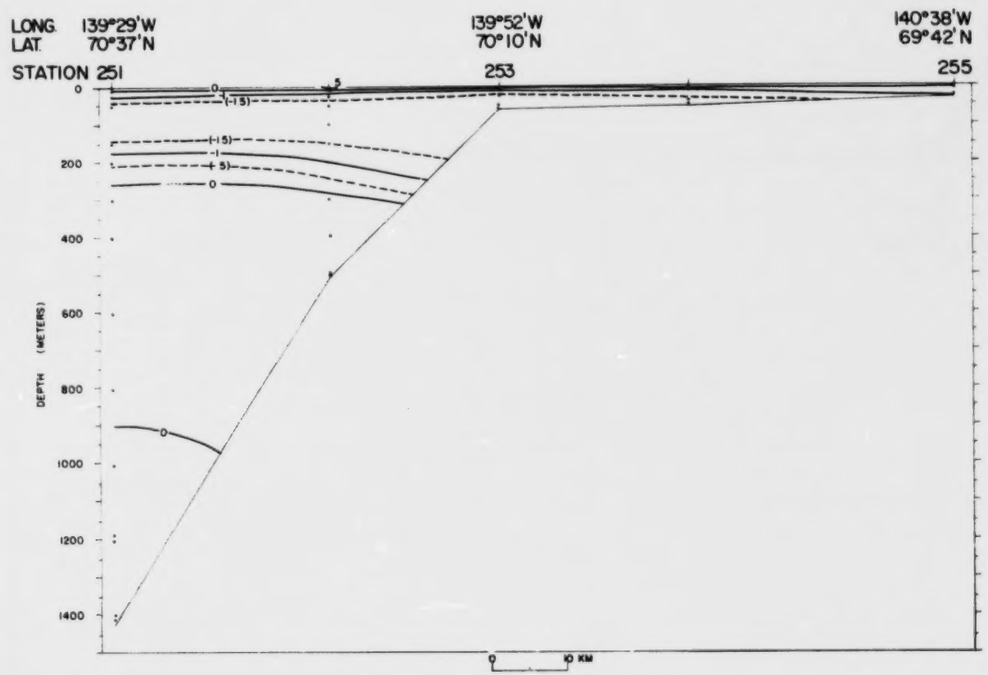
NITRATE (µg-at/l)

EXPEDITION HUDSON 70 EXPEDITION

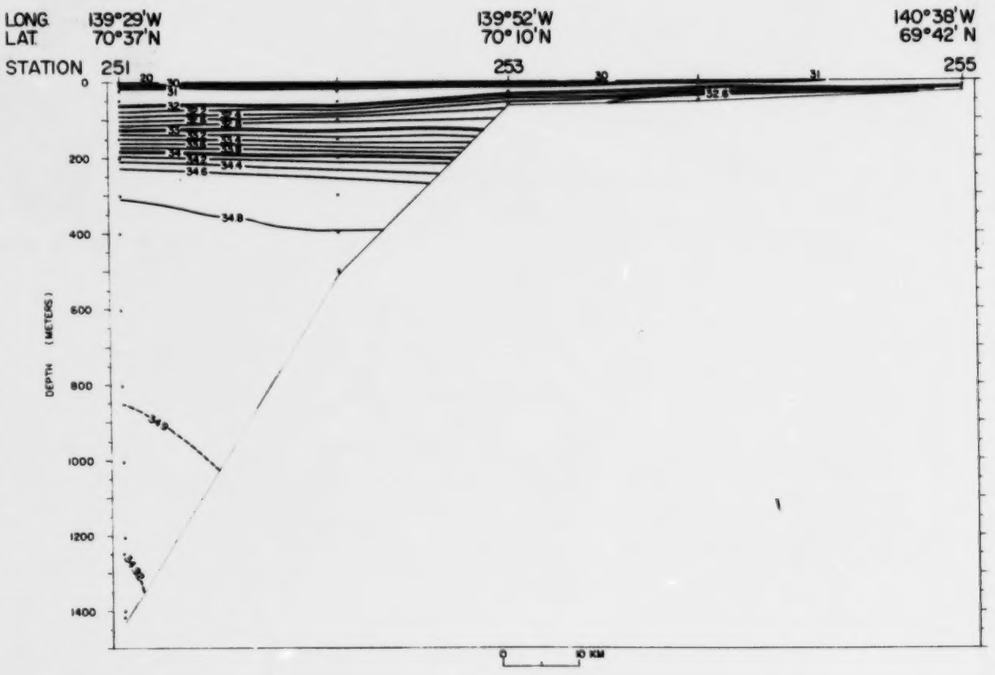



141°W 140° 139° 138° 137° 136° 135° 134° 133° 132° 131° 130° 129° 128°
72°
71°
70°
69°N
BEAUFORT SEA
•251
•252
•253
•254
255
•257
•258
•259
•260
•261
•262
•263
•264
•265
•266
•267
•270
HERSCHEL ISLAND
TUKTOYAKTUK PENINSULA


EXPEDITION HUDSON 70 EXPEDITION

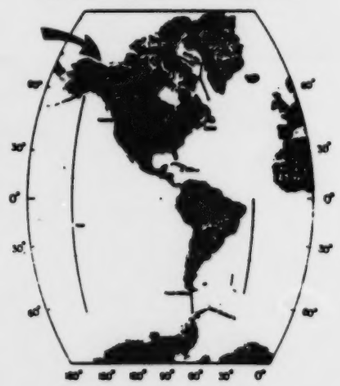


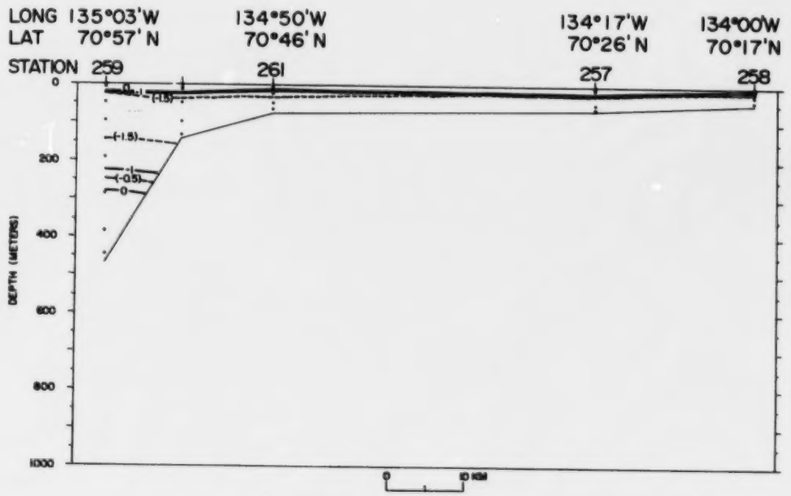
TEMPERATURE (°C)



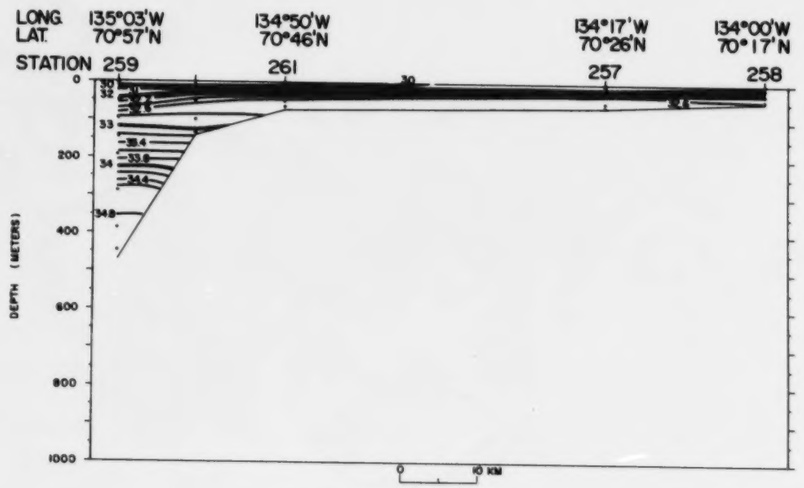
SALINITY (ppt)

EXPÉDITION HUDSON 70 EXPEDITION



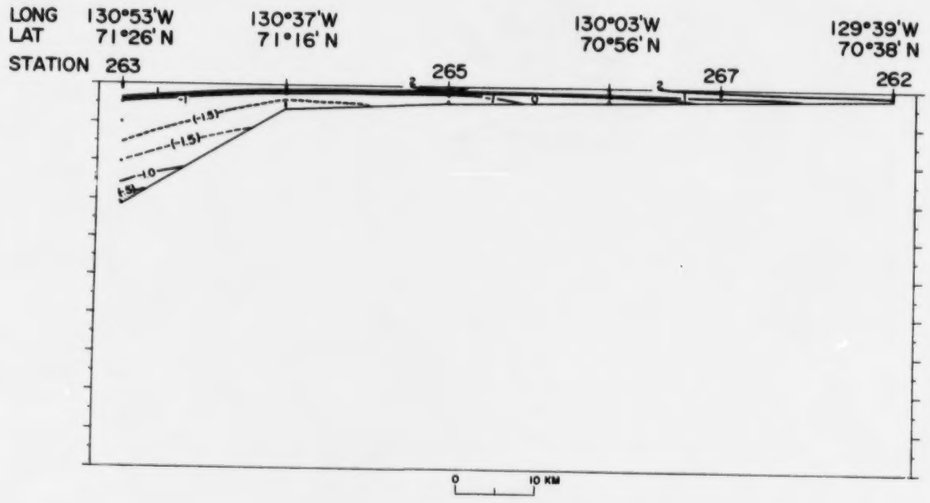


TEMPERATURE (°C)

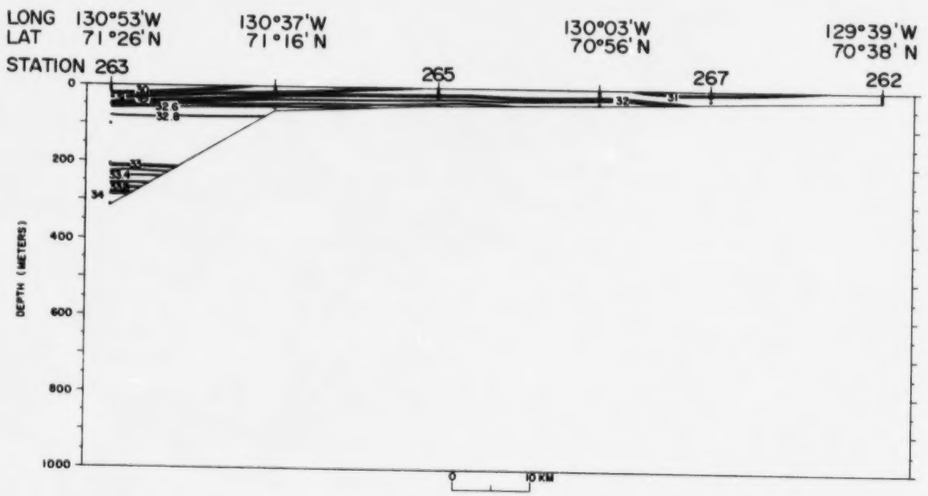


SALINITY (ppt)

EXPEDITION HUDSON 70 EXPEDITION

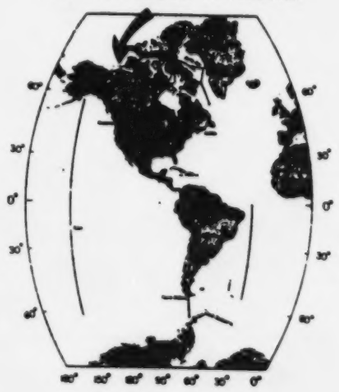


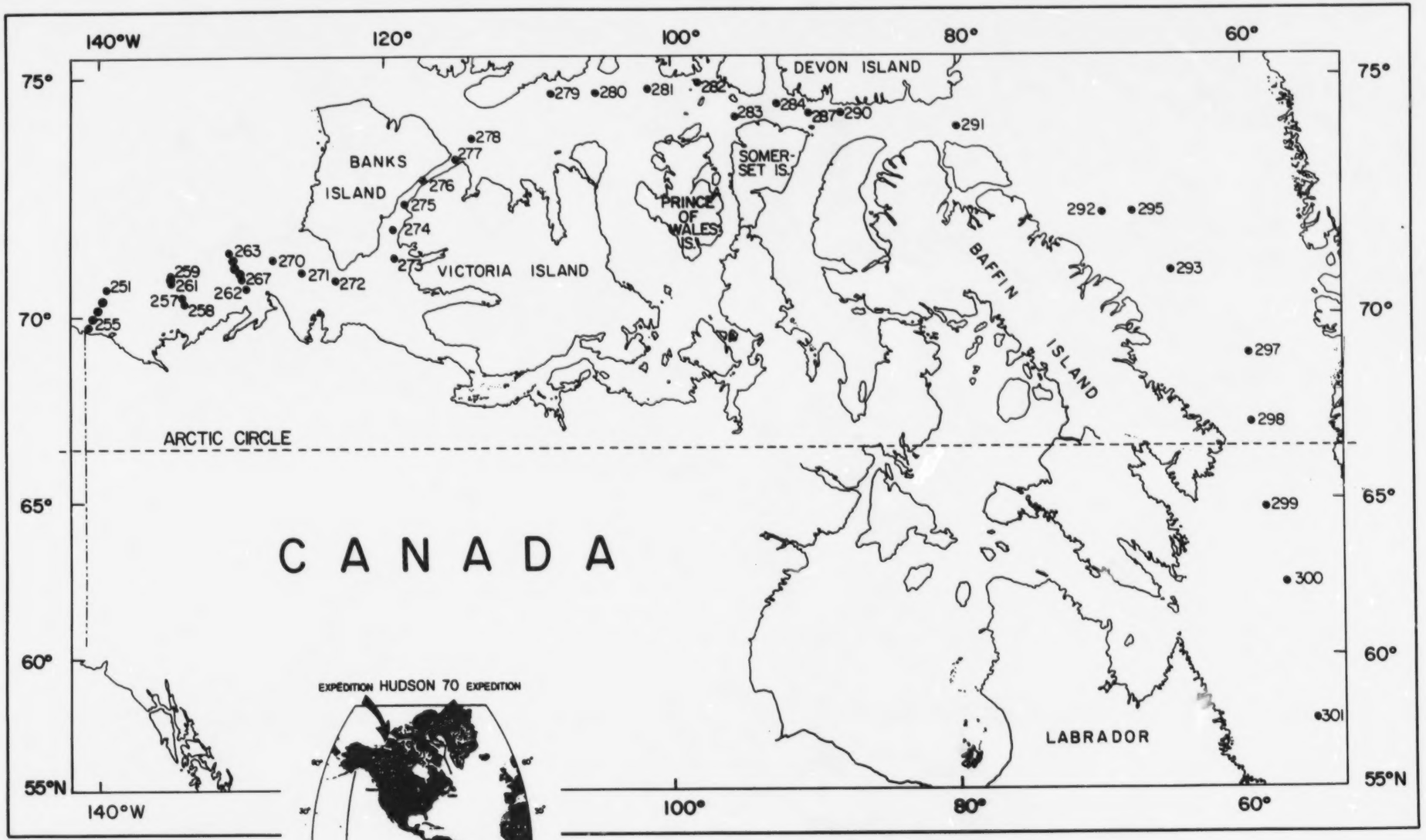
TEMPERATURE (°C)



SALINITY (ppt)

EXPÉDITION HUDSON 70 EXPEDITION




140°W
120°
100°
80°
60°
75°
70°
65°
60°
55°N
DEVON ISLAND
BANKS ISLAND
SOMER-SET IS.
PRINCE OF WALES IS.
VICTORIA ISLAND
BAFFIN ISLAND
ARCTIC CIRCLE
LABRADOR
CANADA
279
280
281
282
283
284
287
290
291
278
277
276
275
274
273
263
270
271
272
267
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251
255
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293
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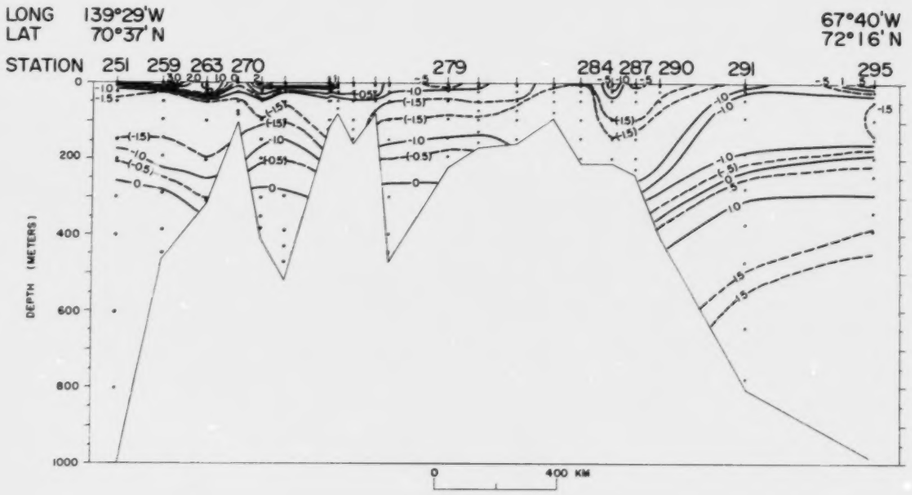
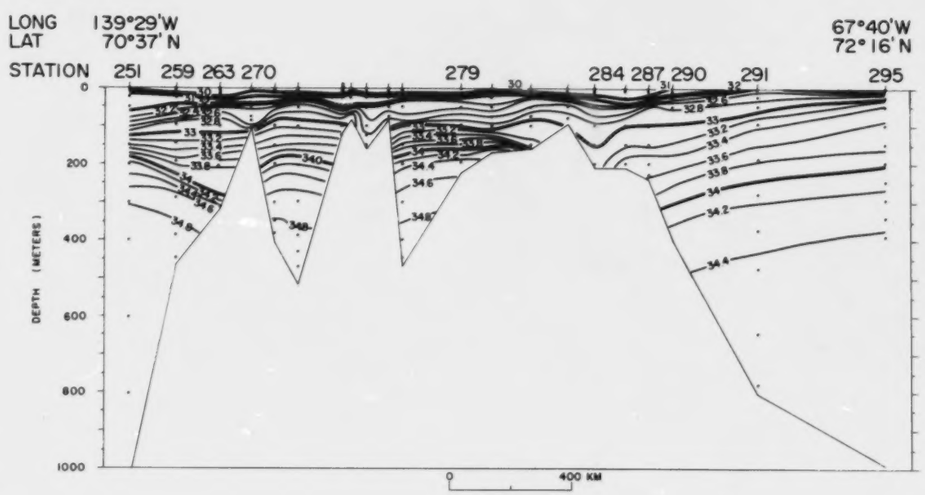
298
299
300
301
EXPEDITION HUDSON 70 EXPEDITION

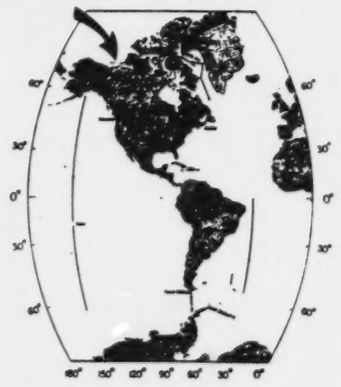


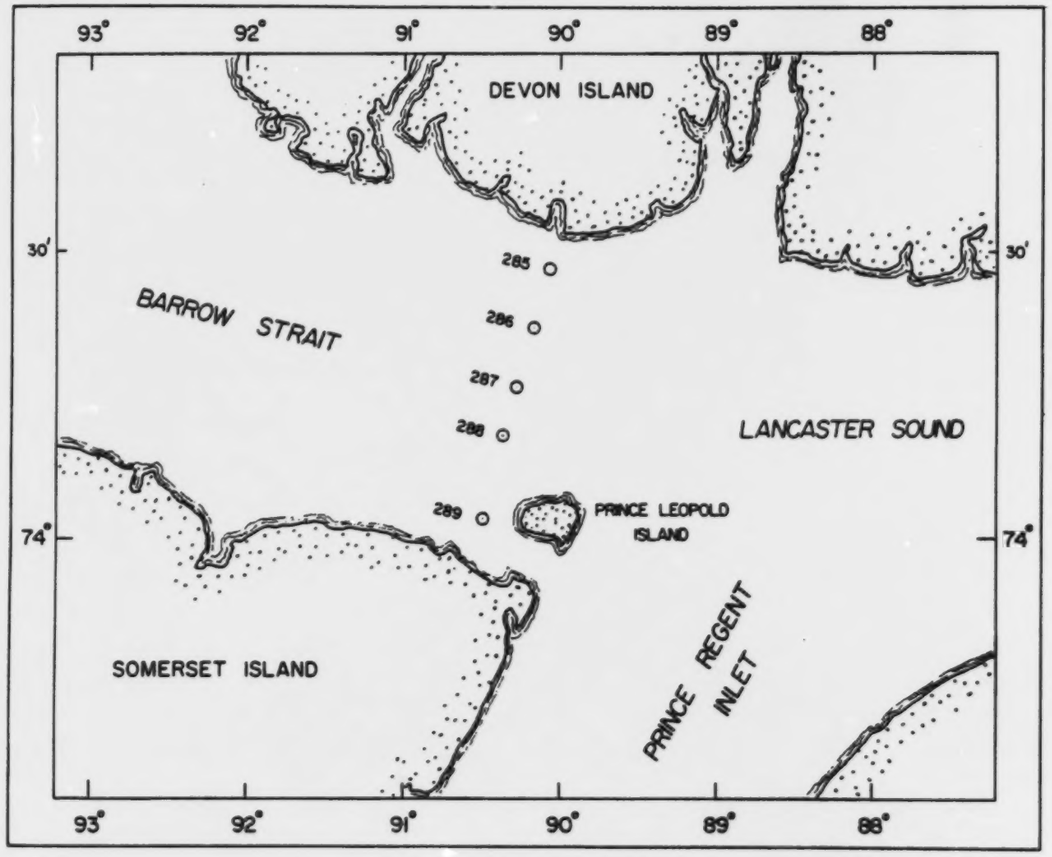
TEMPERATURE (°C)

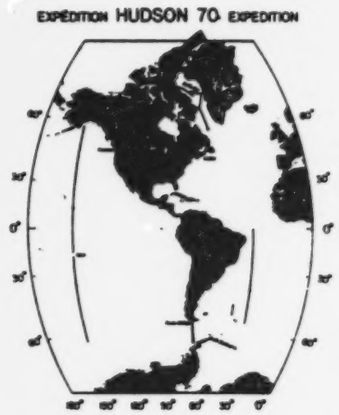


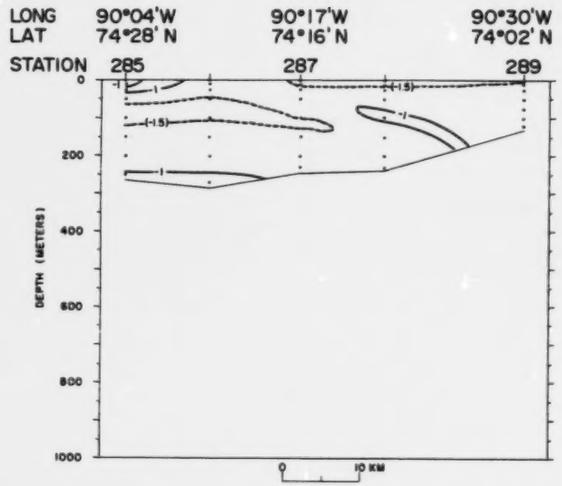
SALINITY (ppt)

EXPÉDITION HUDSON 70 EXPEDITION

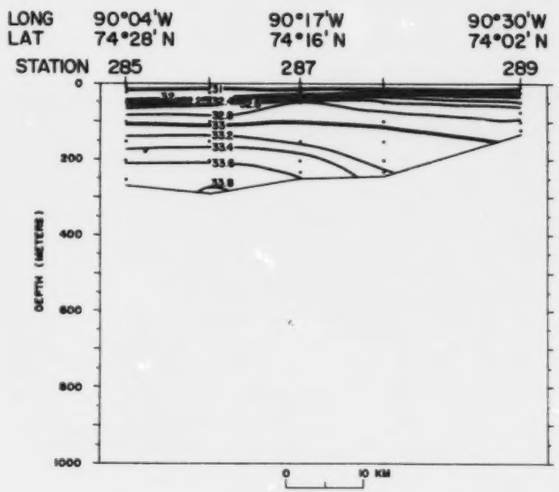



93°
92°
91°
90°
89°
88°
DEVON ISLAND
30'
BARROW STRAIT
285
286
287
288
LANCASTER SOUND
289
PRINCE LEOPOLD ISLAND
74°
SOMERSET ISLAND
PRINCE REGENT INLET

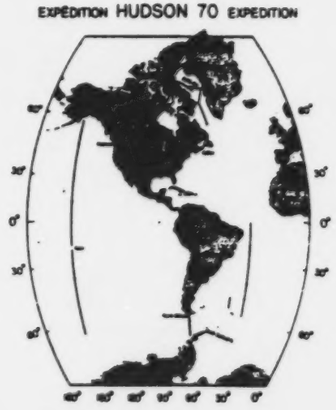

EXPÉDITION HUDSON 70 EXPEDITION

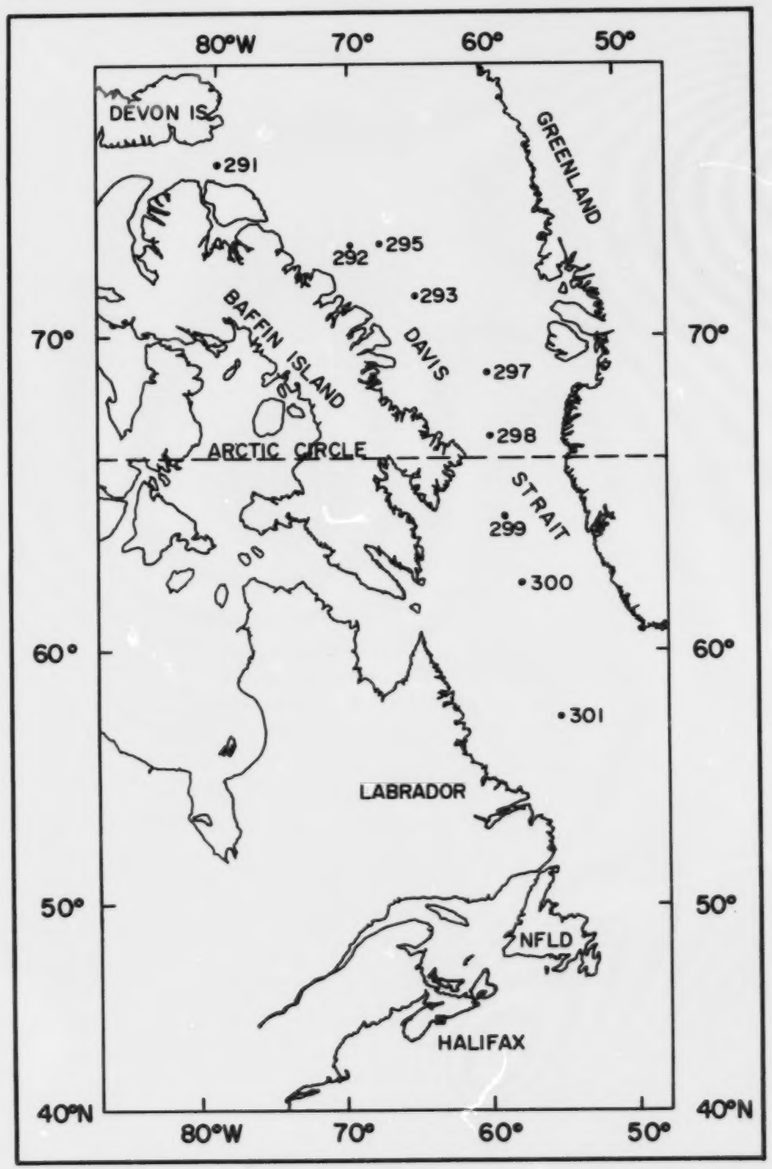


TEMPERATURE (°C)

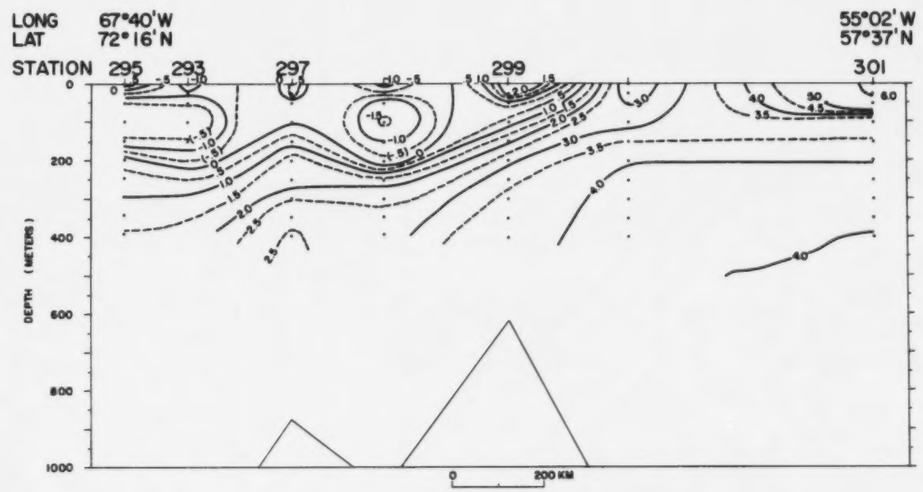


SALINITY (ppt)

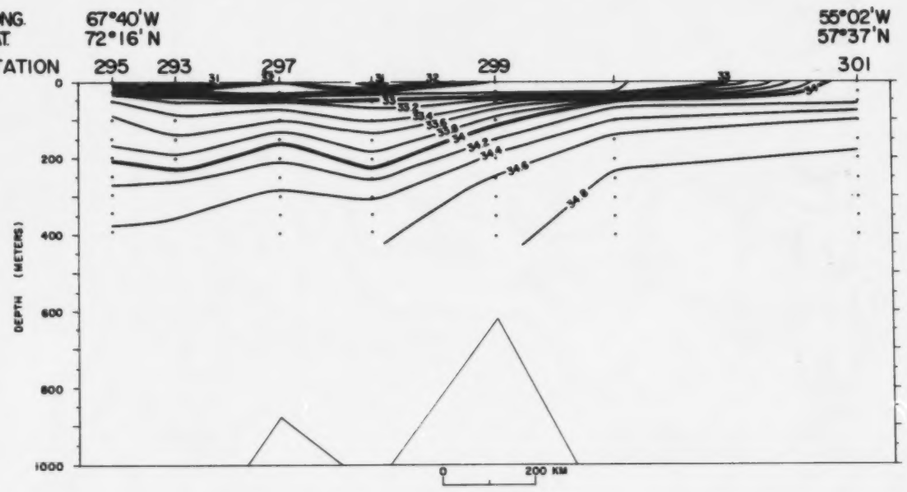



80°W
70°
60°
50°
DEVON IS.
•291
GREENLAND
•295
292
•293
BAFFIN ISLAND
DAVIS
70°
70°
•297
•298
ARCTIC CIRCLE
STRAIT
299
•300
60°
60°
•301
LABRADOR
50°
50°
NFLD
HALIFAX
40°N
40°N
80°W
70°
60°
50°

EXPÉDITION HUDSON 70 EXPEDITION



TEMPERATURE (°C)



SALINITY (ppt)

EXPEDITION HUDSON 70 EXPEDITION

CURRENT METER DATA

CURRENTS

The currents were measured using the film recording Braincon model 316 and 381 current meters. The instruments recorded one exposure every 20 minutes. The film was read manually, and transferred to computer compatible magnetic tape. All graphs were computer produced and plotted on an incremental plotter.

The accuracy of the measurements are (a) current speed ±5 cm/sec for the deeper meters, (b) current direction ±15° which includes the error due to the variation found in the compass swings before and after deployment.

DATA PRESENTATION

For each current meter record, the data are presented on a single page in the form of:

(1) statistical summary and joint distribution table

(2) time series plot, rate and direction

(3) progressive vector plot

(4) stick plot

and for ease of relating the data from the four moorings, the east-west and north-south components of each current meter are displayed together on a separate page, in time series.

STATISTICAL SUMMARY AND JOINT DISTRIBUTION

Statistics - The statistical parameters for each current meter are calculated from the raw data (20 minute sampling interval) and are expressed as U (positive east) and V (positive north). The minimum, maximum, and mean are common measures of the location of a distribution. The standard deviation and variance give an indication of the spread of a distribution. For normal or moderately skewed distributions approximately 68% of the observations will fall within one standard deviation, 95.5% will be within two standard deviations, and better than 99.5% of the observations will lie within three standard deviations from the mean. The trend and intercept are determined by fitting the data to an equation of the form (mt + b) using a linear regression. The trend is simply the slope of the best fit line, the intercept is evaluated for the first sample and time in units of seconds.

Joint Distributions - The joint distribution table describes the percentage occurrence that the data falls into bins defined by bands of speed and direction. In the tables presented here the direction and rate bandwidths are 20° and 5 cm/s. A sample is included in a band if it is equal to or greater than the lower limit, and less than the upper limit. Extreme bands which do not contain any occurrences are dropped, and any bins containing occurrences, but which represent less than 0.1% of the total are reported as 0.0°. Empty bins are left blank. The actual number of occurrences in any given band are reported as subtotals.

TIME SERIES PLOTS

Data for the Rate, Direction, U and V component time series plots were obtained by smoothing the measured data over a three hour period.

The time axis is in units of days with labels every five days and tick marks every 2.5 days. The day number is the G.M.T. day of the year. The vertical scales are in units of cm/s for speed and degrees true for direction.

PROGRESSIVE VECTOR PLOTS

These diagrams are constructed by vectorially adding consecutive data points so as to create the path that a particle would follow if always under the influence of the measured current. The data used for these plots are the same smoothed data used in the time plots. The path is marked every five days by a + sign and the year day number is labelled every ten days. An arrow in the corner of each plot indicates true north and the plot is aligned such that the progressive vector plot and the stick plot have the same orientation.

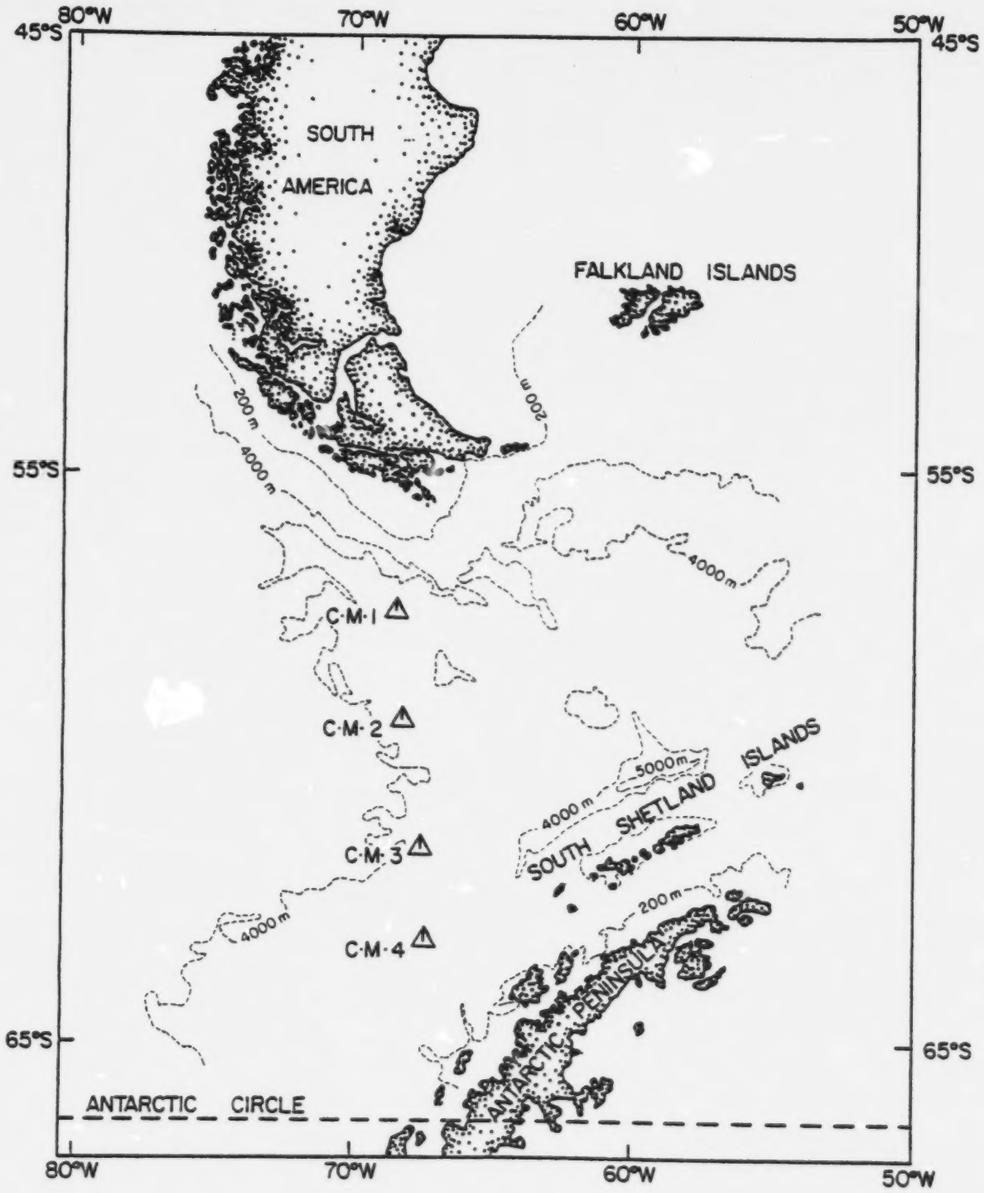
STICK PLOTS

The stick plots were constructed with data that had been smoothed with a filter having a cut-off period of 24 hours and sub-sampled every three hours. The reason for choosing this combination of filter and decimation ratio is purely a visual one. The low frequency motion seemed to be well described and the higher frequencies (tidal and beyond) are removed. To many data points or sticks make a confused picture whereas too few make the change of velocity hard to follow from one vector to another.

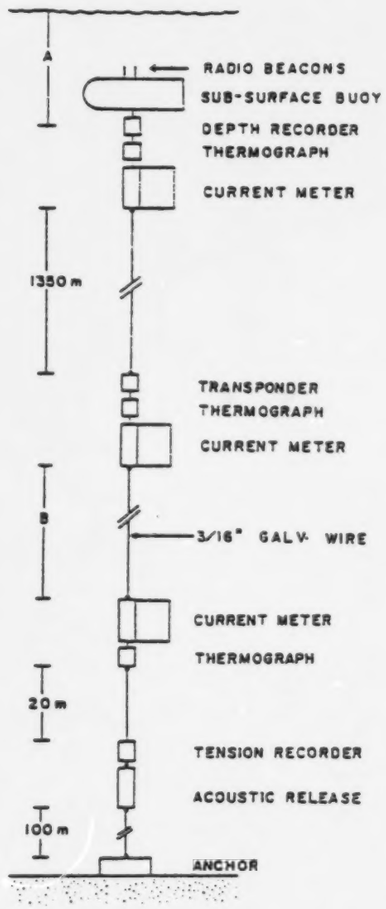
Each stick in the plot is the vector described by the rate and direction data for the time indicated on the horizontal axis at the vector's origin. The time scale is not necessarily the same as that for the rate and direction plots and the amplitude scales may not be the same from one stick plot to another.

HUDSON 70 - DRAKE PASSAGE CURRENT METER INFORMATION (G.M.T. TIME)

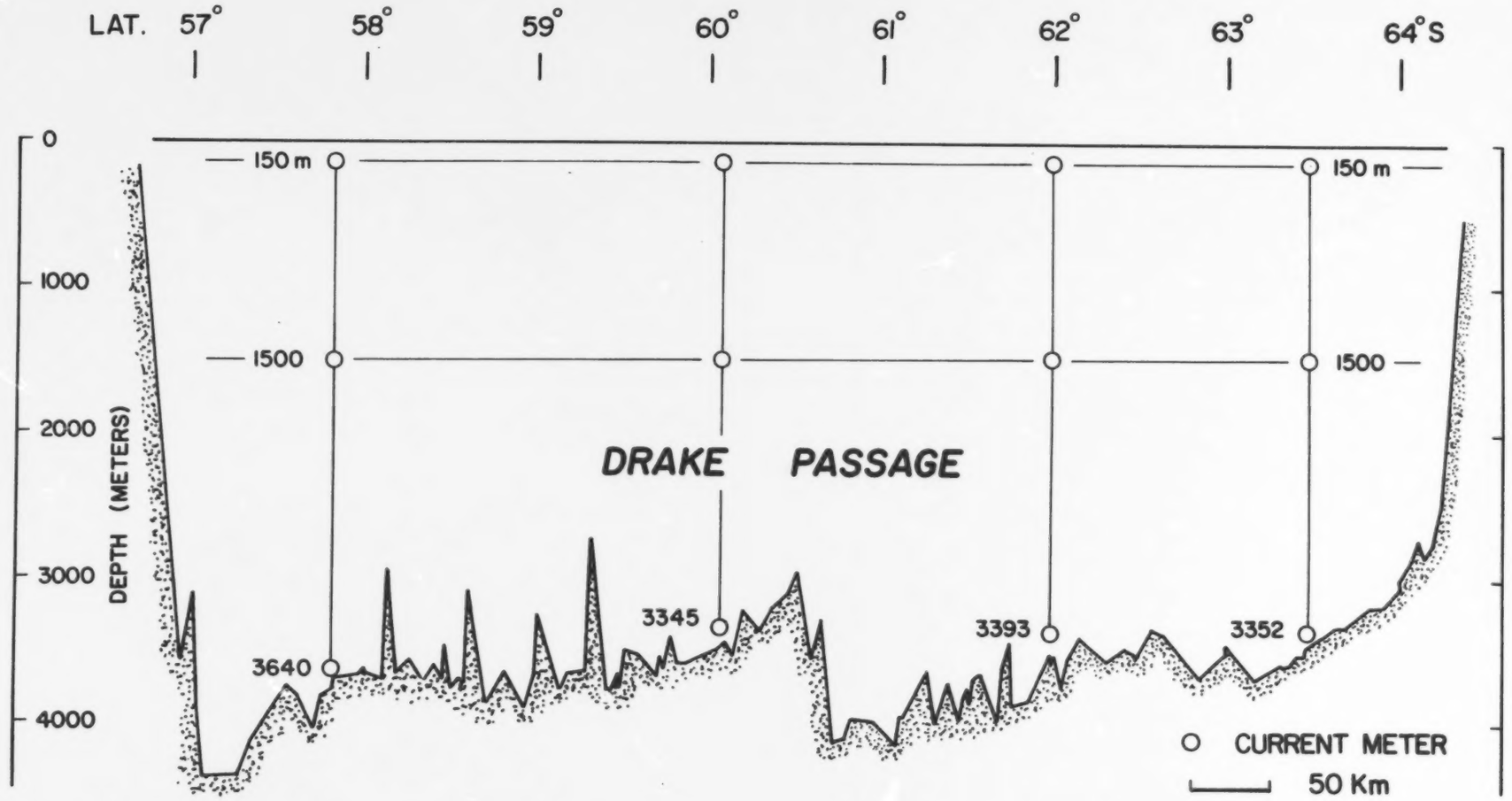
STN. NO.	INSTRUMENT TYPE	DEPTH (M)	POSITION LAT.	POSITION LONG.	SAMPLING INTERVAL	DATA START(HOUR)	DATA START(DAY)	YEAR DAY	DATA DURATION	DATA STOP(HOUR)	DATA STOP(DAY)	YEAR DAY
1	BRAINCON(316)	150	57°49.2S	68°19.6W	20 Min.	19.18	31-01-70	31	10D 15h 20 m	10.38	11-02-70	42
1	BRAINCON(381)	1500	57°49.2S	68°19.6W	20 Min.	17.56	31-01-70	31	10D 17h 40 m	11.36	11-02-70	42
1	BRAINCON(381)	3640	57°49.2S	68°19.6W	20 Min.	19.05	31-01-70	31	10D 17h 0 m	12.05	11-02-70	42
2	BRAINCON(381)	150	60°04.5S	68°04.0W	20 Min.	20.08	01-02-70	32	10D 16h 20 m	12.08	12-02-70	43
2	BRAINCON(381)	1500	60°04.5S	68°04.0W	20 Min.	19.05	01-02-70	32	4D 4h 0 m	23.05	05-02-70	36
2	BRAINCON(381)	3345	60°04.5S	68°04.0W	20 Min.	19.27	01-02-70	32	4D 4h 0 m	23.27	05-02-70	36
3	BRAINCON(381)	150	61°59.0S	67°33.3W	20 Min.	20.29	02-02-70	33	4D 2h 20 m	22.49	06-02-70	37
3	BRAINCON(381)	1500	61°59.0S	67°33.3W	20 Min.	19.04	02-02-70	33	4D 4h 0 m	23.04	06-02-70	37
3	BRAINCON(381)	3393	61°59.0S	67°33.3W	20 Min.	20.06	02-02-70	33	4D 3h 20 m	23.26	06-02-70	37
4	BRAINCON(381)	150	63°28.1S	67°07.0W	20 Min.	19.08	03-02-70	34	4D 1h 40 m	20.48	07-02-70	38
4	BRAINCON(381)	1500	63°28.1S	67°07.0W	20 Min.	19.05	03-02-70	34	4D 2h 0 m	21.05	07-02-70	38
4	BRAINCON(381)	3352	63°28.1S	67°07.0W	20 Min.	17.28	03-02-70	34	4D 0h 20 m	17.48	07-02-70	38



MOORING CONFIGURATION



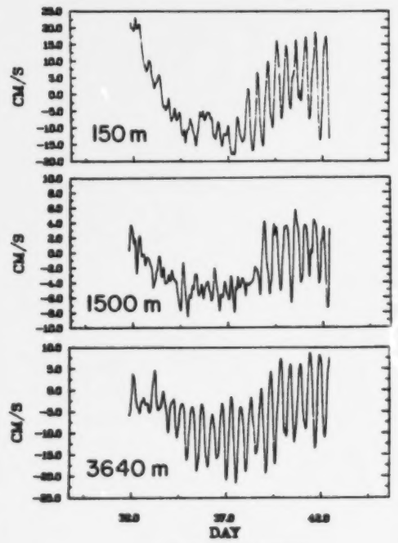
MOORING	LENGTH (meters) A	B
1	162	2137
2	145	1843
3	130	1890
4	132	1850



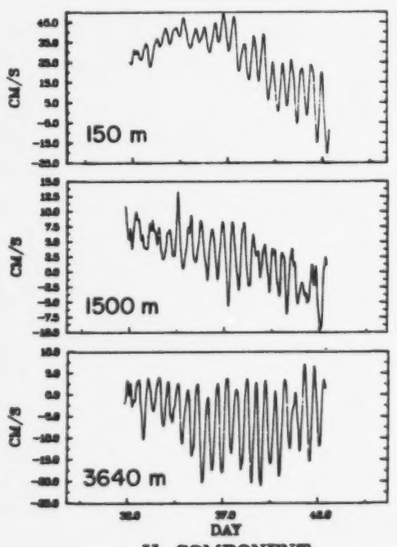
· BOTTOM PROFILE of DRAKE PASSAGE on LINE of CURRENT METERS ·

STA.1

31 JAN.–11 FEB. 1970



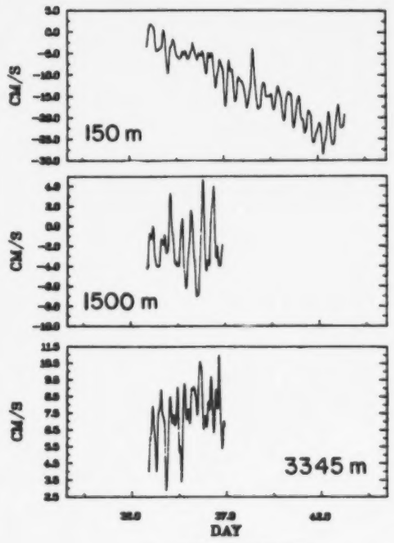
V–COMPONENT



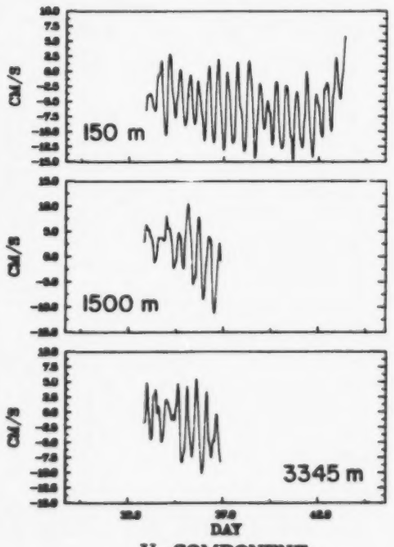
U–COMPONENT

STA.2

1 FEB.–12 FEB. 1970



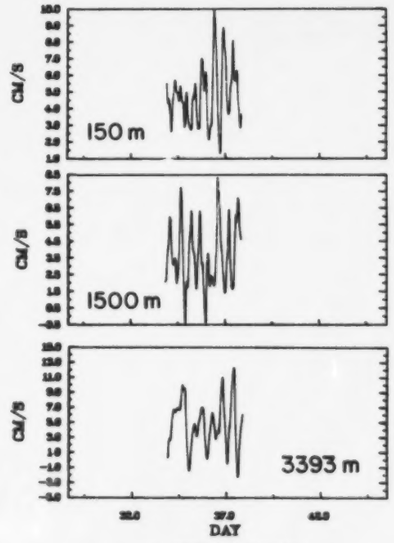
V–COMPONENT



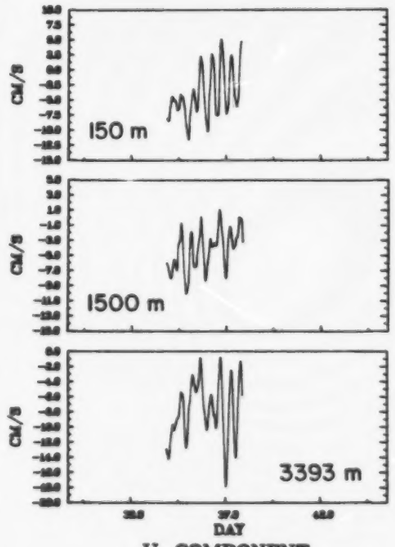
U–COMPONENT

STA.3

2 FEB.–6 FEB. 1970



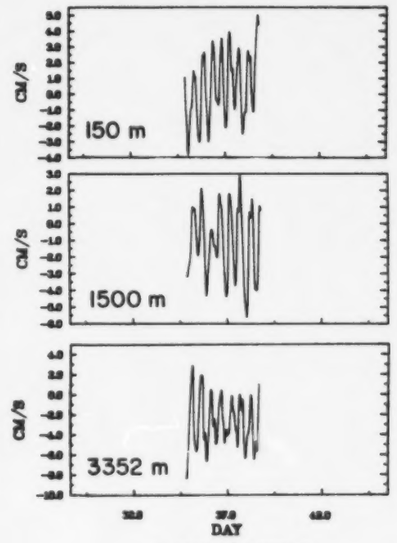
V–COMPONENT



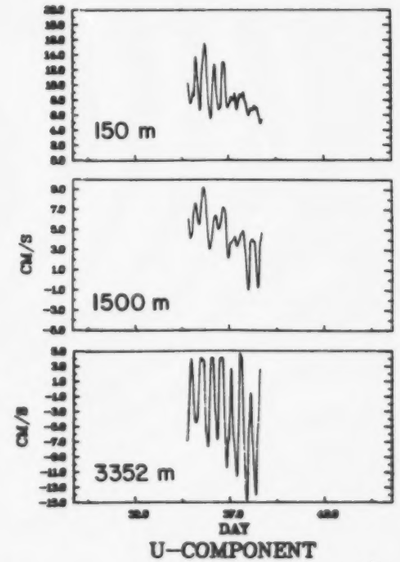
U–COMPONENT

STA.4

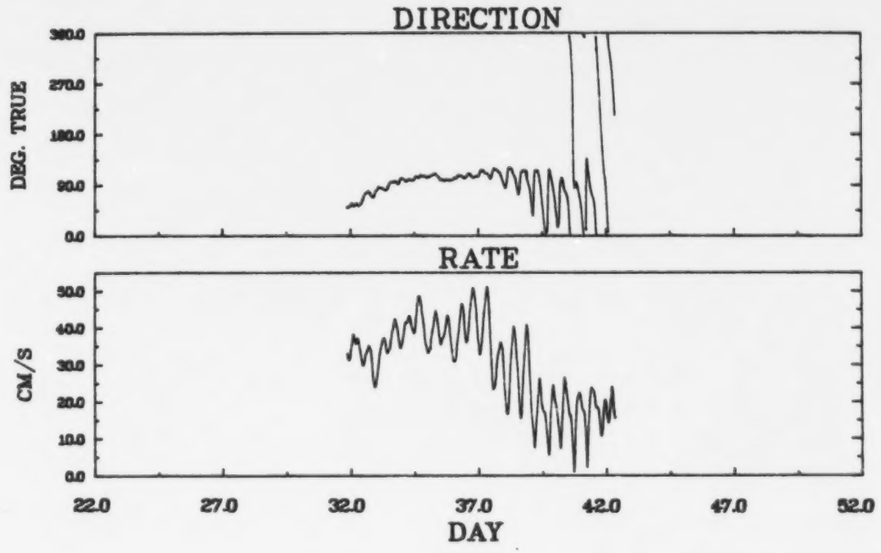
3 FEB.–7 FEB. 1970



V–COMPONENT



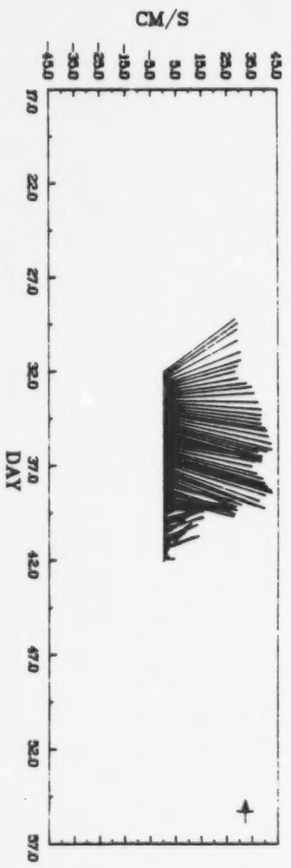
U–COMPONENT

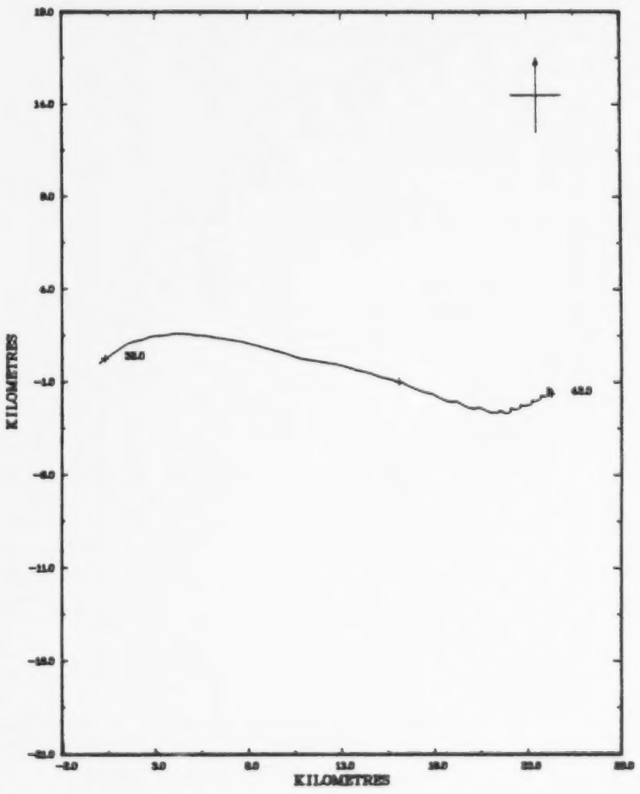


RATE VS DIRECTION

CM/S / DEG. TRUE		SUB TOTAL	0 TO 5.00	5.00 TO 10.00	10.00 TO 15.00	15.00 TO 20.00	20.00 TO 25.00	25.00 TO 30.00	30.00 TO 35.00	35.00 TO 40.00	40.00 TO 45.00	45.00 TO 50.00	50.00 TO 55.00
340.00 TO	360.00	14	*	.4	.9	.9							
320.00 TO	340.00	9	*	.1	.1	.4	.4	.1					
300.00 TO	320.00	5	*	.5		.1		.3					
280.00 TO	300.00	7	*	.1		.3	.5						
260.00 TO	280.00	2	*			.3							
240.00 TO	260.00	2	*		.1	.1							
220.00 TO	240.00	6	*	.3	.3	.3							
200.00 TO	220.00	5	*	.1	.1	.1							
180.00 TO	200.00	8	*	.1	.3	.4							
160.00 TO	180.00	5	*	.1	.1	.1							
140.00 TO	160.00	5	*	.5		.4							
120.00 TO	140.00	24	*	.1	.5	.4	1.2	.1	.3	.5			
100.00 TO	120.00	272	*	.4	.5	1.5	2.4	1.6	5.5	9.6	7.1	0.5	1.2
80.00 TO	100.00	211	*	.5	.5	1.5	3.1	2.7	6.5	8.2	5.5		
60.00 TO	80.00	87	*	.3	.5	1.5	4.7	1.7	2.5	.7			
40.00 TO	60.00	42	*	.3	.1	1.0	.1	.5	2.6	1.9			
20.00 TO	40.00	19	*	.3	.7	1.3				.1	.1		
0.00 TO	20.00	27	*	.3	.5	1.5	.5						
360 TOTAL		759	0	32	45	101	97	56	151	159	97	45	0

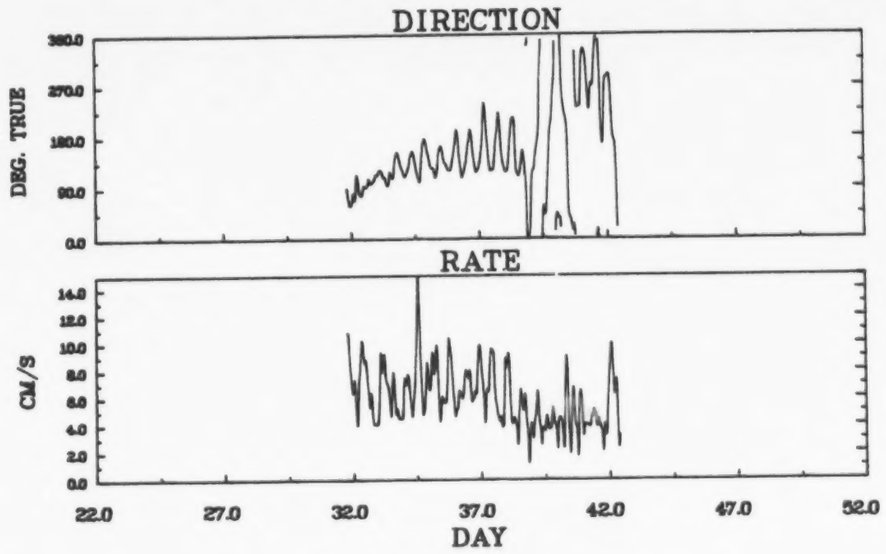
CHAN	NAME	UNIT	NUMBER	MIN	MAX	MEAN	INTERCEPT	TREND/DEG	VARIANCE	STD. DEV.
1	U COMPONENT	CM/S	760	-.21304E+02	.92195E+02	.26511E+02	43.897	-.982396-01	.222938E+03	.149311E+02
2	V COMPONENT	CM/S	760	-.19215E+02	.37968E+02	-.14158E+01	-.686	-.199245-01	.119958E+03	.109511E+02

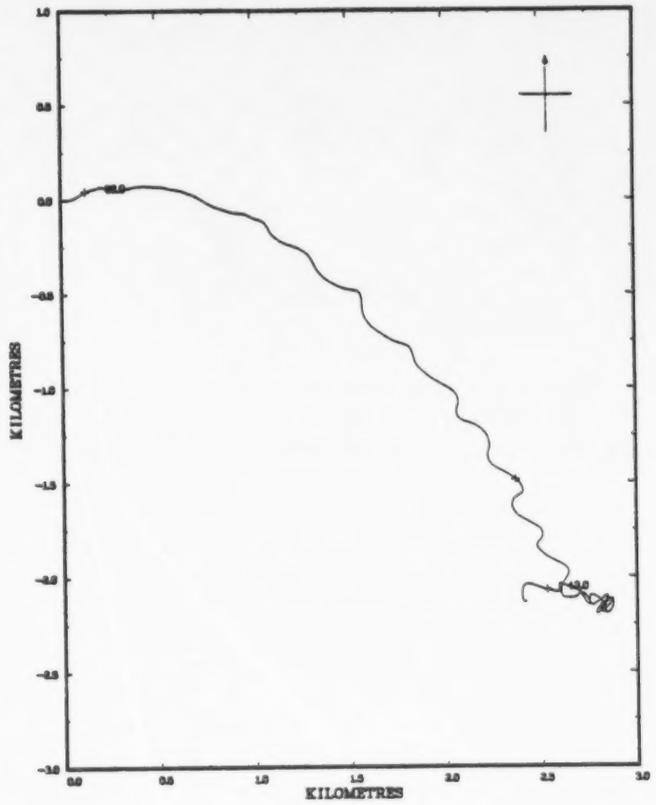


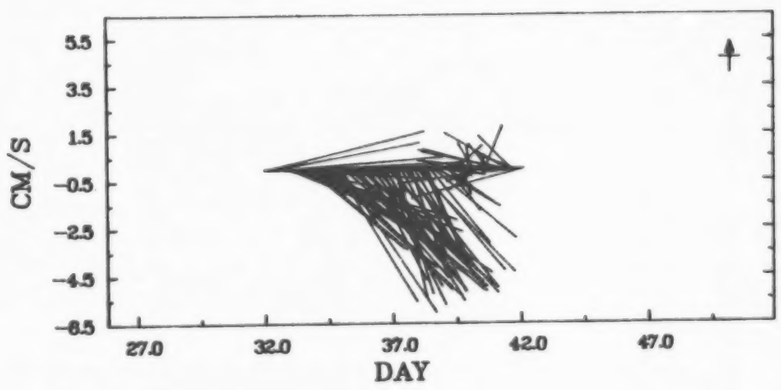


JAN.31-FEB.11 1970

STA.1 150m







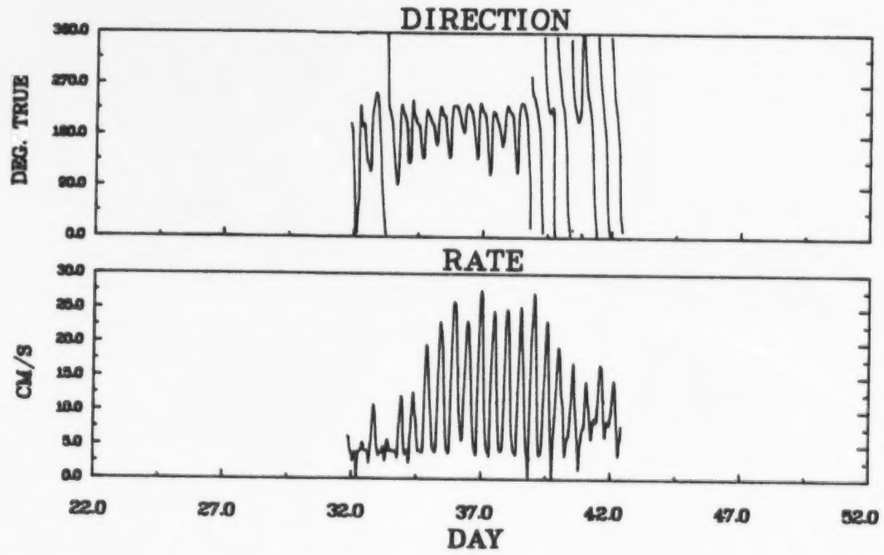
RATE VS DIRECTION

CM/S / DEG. TRUE		SUB TOTAL	OUT OF RANGE	0.00 TO 5.00	5.00 TO 10.00	10.00 TO 15.00	15.00 TO 20.00
340.00 TO	360.00	16	0	1.8	.3		
320.00 TO	340.00	13	0	1.7			
300.00 TO	320.00	12	0	1.6			
280.00 TO	300.00	29	0	1.4	1.4	.6	
260.00 TO	280.00	22	0	1.0	1.0		
240.00 TO	260.00	13	0	.5	1.2		
220.00 TO	240.00	34	0	1.0	2.3	.1	
200.00 TO	220.00	51	0	2.3	1.6		
180.00 TO	200.00	94	0	1.7	2.7		
160.00 TO	180.00	63	0	3.0	3.4		
140.00 TO	160.00	85	0	3.9	7.4	.1	
120.00 TO	140.00	144	0	3.9	11.3	3.9	.1
100.00 TO	120.00	123	0	4.3	10.0	1.4	.3
80.00 TO	100.00	63	0	2.3	4.9	.9	
60.00 TO	80.00	29	0	.3	1.7	.9	
40.00 TO	60.00	30	0	2.6	1.3		
20.00 TO	40.00	22	0	1.9	.9		
0.00 TO	20.00	21	0	2.7			
SUB TOTAL		772	0	301	411	13	3

CHAN	NAME	UNIT	NUMBER	MIN	MAX	MEAN	INTERCEPT	TREND/SEC	VARIANCE	STD. DEV.
1	U COMPONENT	CM/S	772	-.10740E+02	.14531E+02	.20370E+01	7.01°	-.113446-04	.208396E+02	.447808E+01
2	V COMPONENT	CM/S	772	-.09*75E+01	.60958E+01	-.22370E+01	-3.64°	.389307-09	.117819E+02	.342900E+01

JAN. 31-FEB. 11 1970

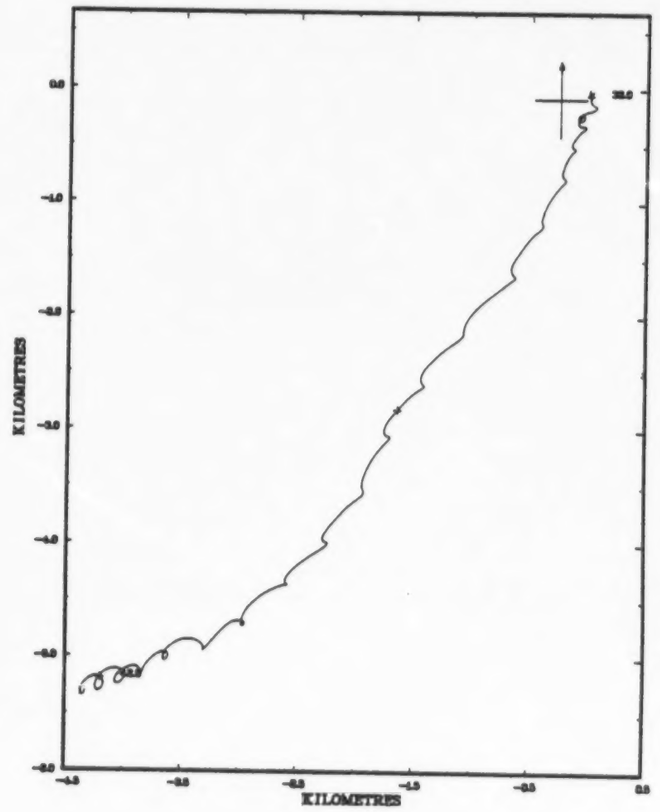
STA. 1 1500m

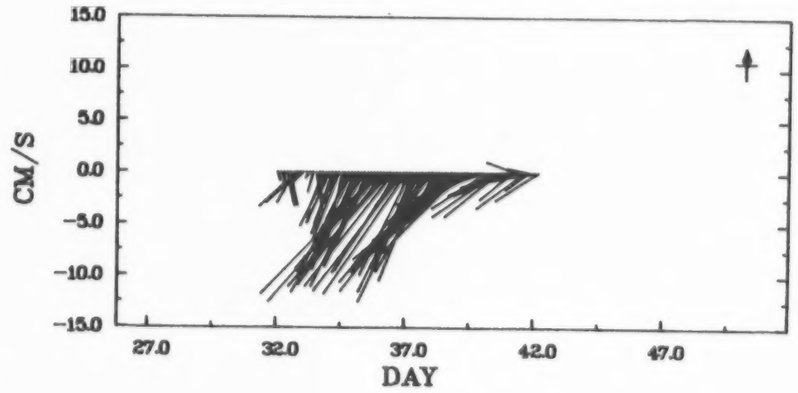


RATE VS DIRECTION

CM/S / DEG. TRUE	SUB TOTAL	BUT ZEROS	0.00 TO 5.00	5.00 TO 10.00	10.00 TO 15.00	15.00 TO 20.00	20.00 TO 25.00	25.00 TO 30.00
340.00 TO 360.00	24	0	.8	1.0	.1	.4		
320.00 TO 340.00	13	0	.3	1.0	.1			
300.00 TO 320.00	10	0		.9	.4			
280.00 TO 300.00	13	0		.9	.5	.1		
260.00 TO 280.00	15	0	.3	.9	.5	.4	.1	
240.00 TO 260.00	48	0	.3	1.3	2.3	1.6	.9	
220.00 TO 240.00	148	0	.8	3.4	4.9	3.3	2.3	2.3
200.00 TO 220.00	157	0	2.7	3.8	4.0	3.2	2.9	1.6
180.00 TO 200.00	86	0	2.2	3.2	2.6	.1		
160.00 TO 180.00	92	0	3.6	3.0	.1			
140.00 TO 160.00	92	0	3.6	1.2				
120.00 TO 140.00	36	0	1.7	.3				
100.00 TO 120.00	30	0	1.0	.1				
80.00 TO 100.00	17	0	1.0	.4				
60.00 TO 80.00	9	0	.8	.4				
40.00 TO 60.00	10	0	1.2	.8				
20.00 TO 40.00	15	0	.6	1.7				
0.00 TO 20.00	24	0	1.6	1.7				
SUB TOTAL	770	0	230	214	132	67	50	30

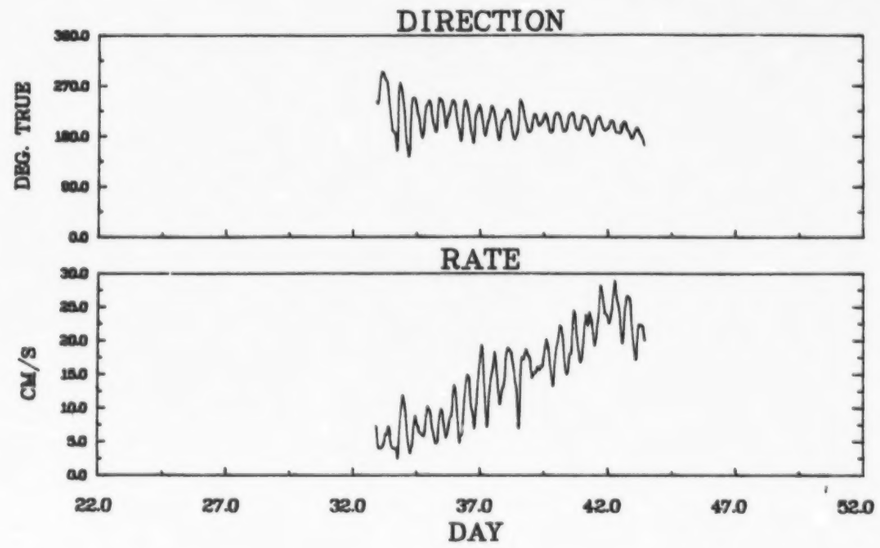
CHAN	NAME	UNIT	NUMBER	MIN	MAX	MEAN	INTERCEPT TREND(/SEC)	VARIANCE	STD. DEV.
1	U COMPONENT	CM/S	770	-.2324E+02	.9075E+01	-.6721E+01	-6.999 -.4731E-09	.9027E+02	.9500E+01
2	V COMPONENT	CM/S	770	-.3294E+02	.1994E+02	-.3557E+01	-6.971 .2777E-08	.9037E+01	.7125E+01

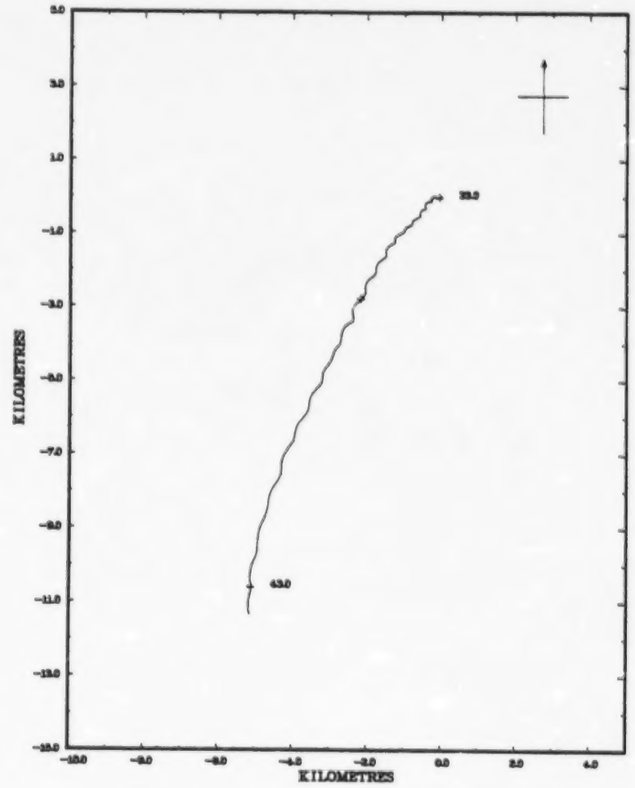




JAN.31-FEB.11 1970

STA.1 3640m

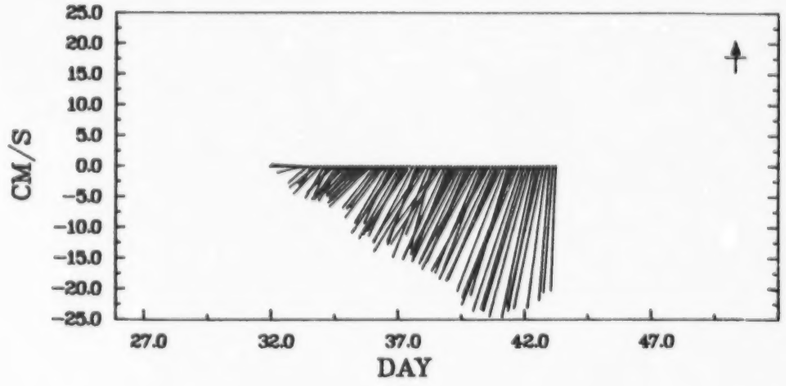




RATE VS DIRECTION

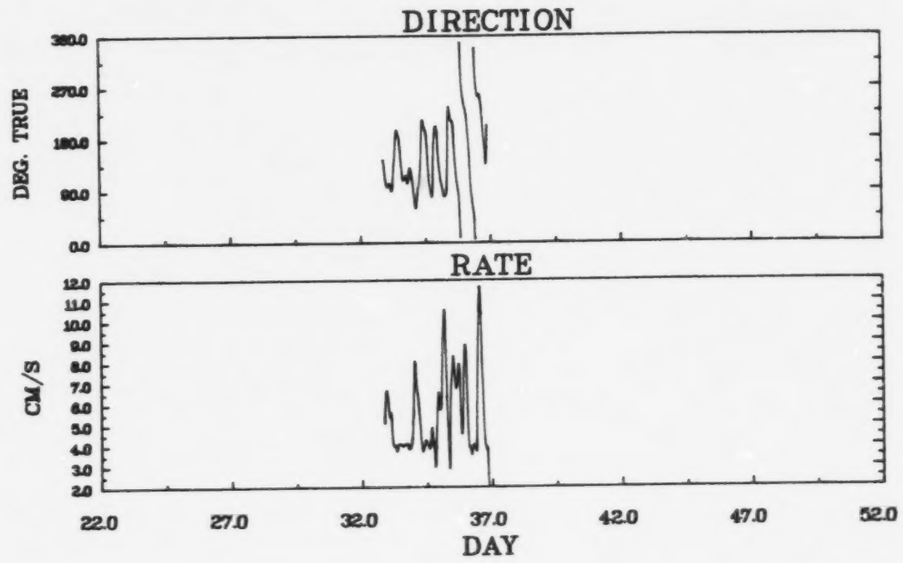
CM/S / DEG. TRUE		SUB TOTAL	OUT RANGE	0 TO 5 0.0	5 TO 10 5.0	10 TO 15 10.0	15 TO 20 15.0	20 TO 25 20.0	25 TO 30 25.0	30 TO 35 30.0
000.00	TO 020.00	1	*	.1						
020.00	TO 040.00	20	*	1.7	.9					
040.00	TO 060.00	16	*	.7	1.7	.3				
060.00	TO 080.00	24	*	.9	3.4	2.6	.1			
080.00	TO 100.00	129	*	.7	9.9	4.0	9.1	.7		
100.00	TO 120.00	216	*	.4	9.1	4.4	9.9	6.6	2.1	
120.00	TO 140.00	246	*	2.2	3.4	4.2	10.4	7.6	4.3	
140.00	TO 160.00	72	*	1.3	2.3	1.7	1.2	2.6	.9	
160.00	TO 180.00	11	*	.9	.4	.1	.3			
180.00	TO 200.00	2	*	.1	.1					
SUB TOTAL		760	0	69	171	139	304	134	91	

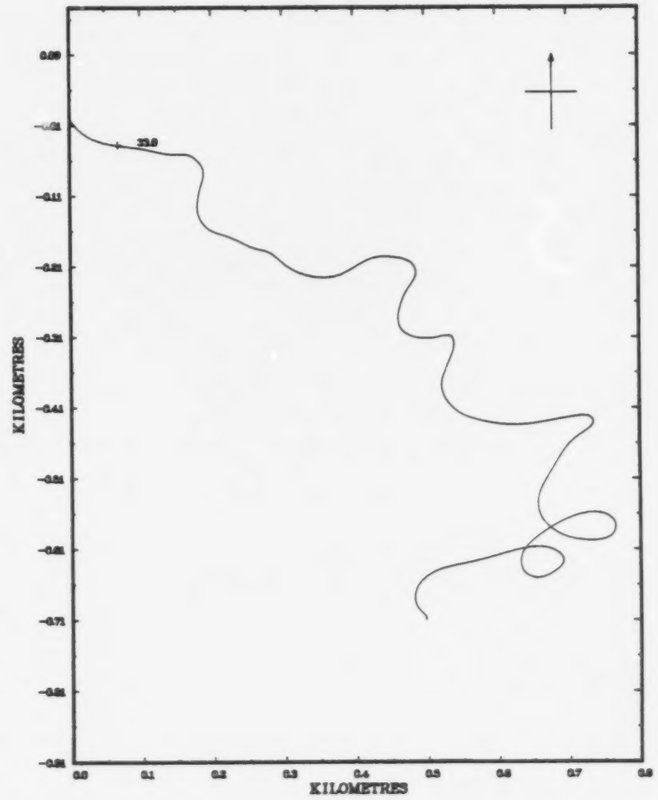
CHAN	NAME	UNIT	NUMBER	MIN	MAX	MEAN	INTERCEPT	TREND(/SEC)	VARIANCE	STD. DEV.
1	U COMPONENT	CM/S	760	-.16108E+02	.49722E+01	-.39912E+01	-4.959	-.199238E-03	.206836E+02	.454215E+01
2	V COMPONENT	CM/S	760	-.29098E+02	.21188E+01	-.12448E+02	-.355	-.237941E-04	.361778E+02	.749918E+01



FEB.1–FEB.12 1970

STA.2 150m

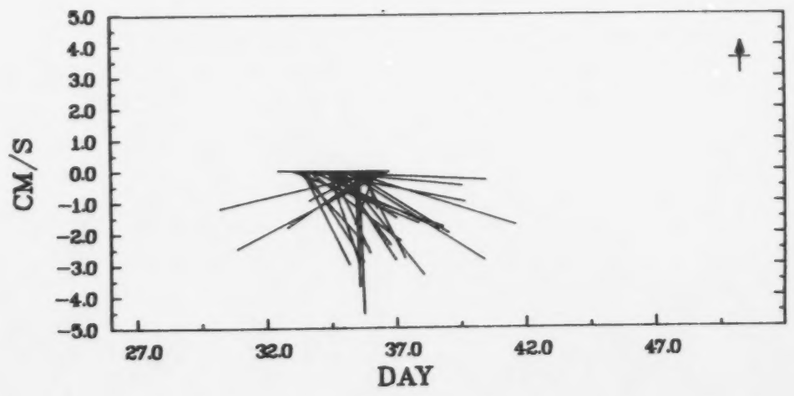




RATE VS DIRECTION

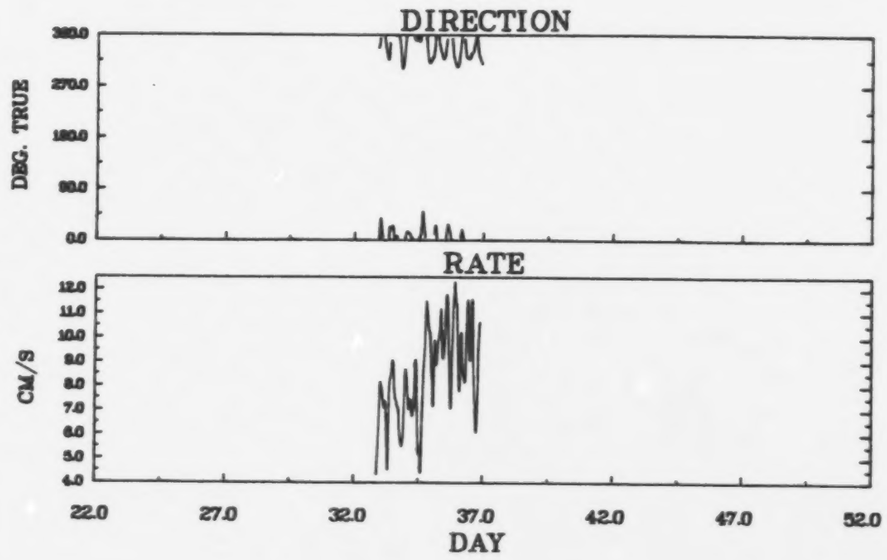
CM/S DEG. TRUE		SUB TOTAL	OUT OF RANGE	0 TO 9.99	10 TO 19.99	20 TO 29.99
340.00 TO	360.00	2	0	.3	.3	
320.00 TO	340.00	1	0		.3	
300.00 TO	320.00	3	0		1.0	
280.00 TO	300.00	5	0		1.7	
260.00 TO	280.00	7	0		2.0	.3
240.00 TO	260.00	19	0		3.7	2.7
220.00 TO	240.00	13	0	2.0	2.3	
200.00 TO	220.00	27	0	4.7	4.0	.3
180.00 TO	200.00	26	0	7.0	1.7	
160.00 TO	180.00	28	0	9.4	1.3	
140.00 TO	160.00	20	0	4.7	2.0	
120.00 TO	140.00	39	0	8.7	4.0	
100.00 TO	120.00	42	0	7.0	7.0	
80.00 TO	100.00	48	0	7.0	7.7	1.3
60.00 TO	80.00	16	0	2.0	2.7	.7
40.00 TO	60.00	9	0	1.7	1.3	
20.00 TO	40.00	2	0	.3	.3	
0.00 TO	20.00	1	0		.3	
SUB TOTAL		299	0	152	131	16

CHAN	NAME	UNIT	NUMBER	MIN	MAX	MEAN	INTERCEPT	TREND(/SEC)	VARIANCE	STD. DEV.
1	U COMPONENT	CM/S	299	-.1290E+02	.1347E+02	.1991E+01	9.981	-.221446-04	.243706E+02	.493722E+01
2	V COMPONENT	CM/S	299	-.9048E+01	.9989E+01	-.8883E+01	-2.999	.179986-09	.719156E+01	.268177E+01



FEB.1-FEB.5 1970

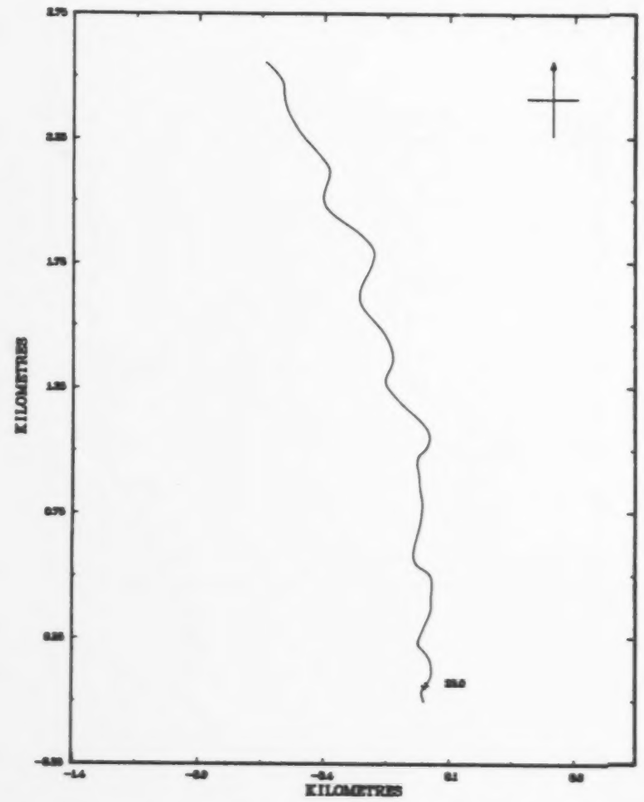
STA.2 1500m

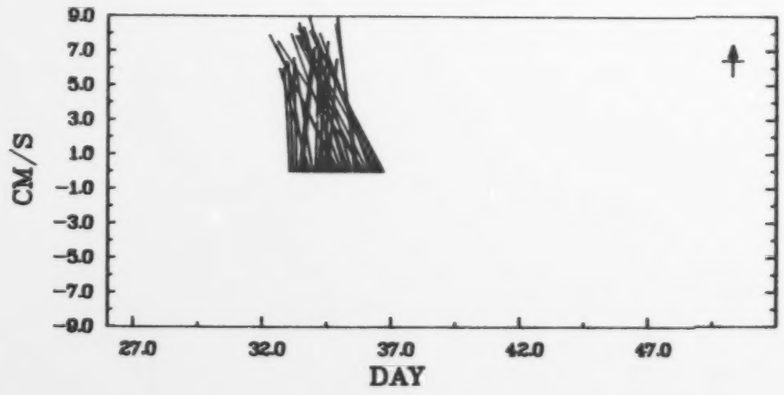


RATE VS DIRECTION

CM/S / DEG. TRUE		SUB TOTAL	OUT RANGE	0 TO 5.00	5 TO 10.00	10 TO 15.00
340.00 TO	360.00	41	0	1.0	19.1	1.3
320.00 TO	340.00	47	0	2.3	19.1	9.0
300.00 TO	320.00	68	0	.3	9.7	14.0
280.00 TO	300.00	8	0		2.7	1.0
260.00 TO	280.00		0			
240.00 TO	260.00		0			
220.00 TO	240.00		0			
200.00 TO	220.00		0			
180.00 TO	200.00		0			
160.00 TO	180.00		0			
140.00 TO	160.00		0			
120.00 TO	140.00		0			
100.00 TO	120.00	1	0		.3	
80.00 TO	100.00		0			
60.00 TO	80.00	5	0		1.0	
40.00 TO	60.00		0			
20.00 TO	40.00	72	0		6.0	2.7
0.00 TO	20.00	73	0		20.1	4.3
360 TOTAL		299	0	11	383	85

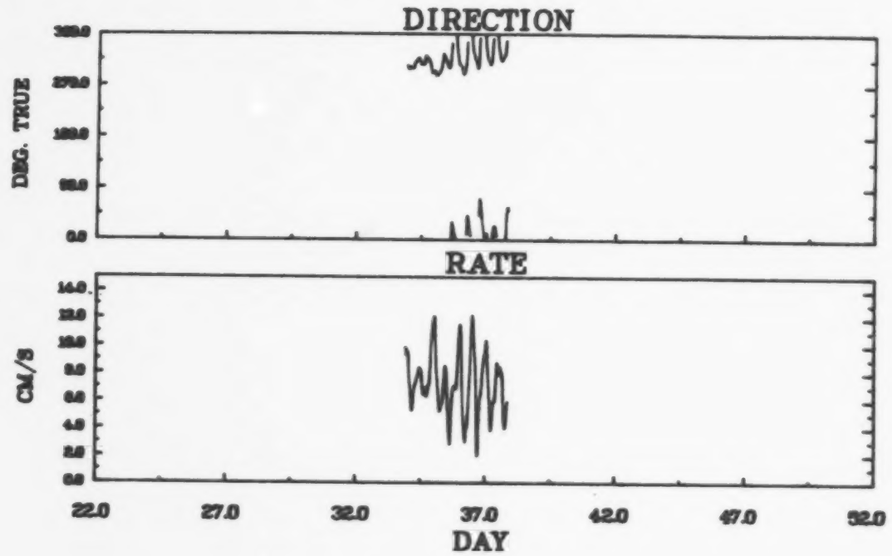
CHAN	NAME	UNIT	NUMBER	MIN	MAX	MEAN	INTERCEPT	TREND/SEC)	VARIANCE	STD. DEV.
1	U COMPONENT	CM/S	299	-.11400E+02	.47310E+01	-.19036E+01	.970	-.160210E-04	.17928E+02	.13041E+01
2	V COMPONENT	CM/S	299	-.27300E+01	.12340E+02	.72900E+01	4.176	.614700E-05	.37690E+01	.19414E+01

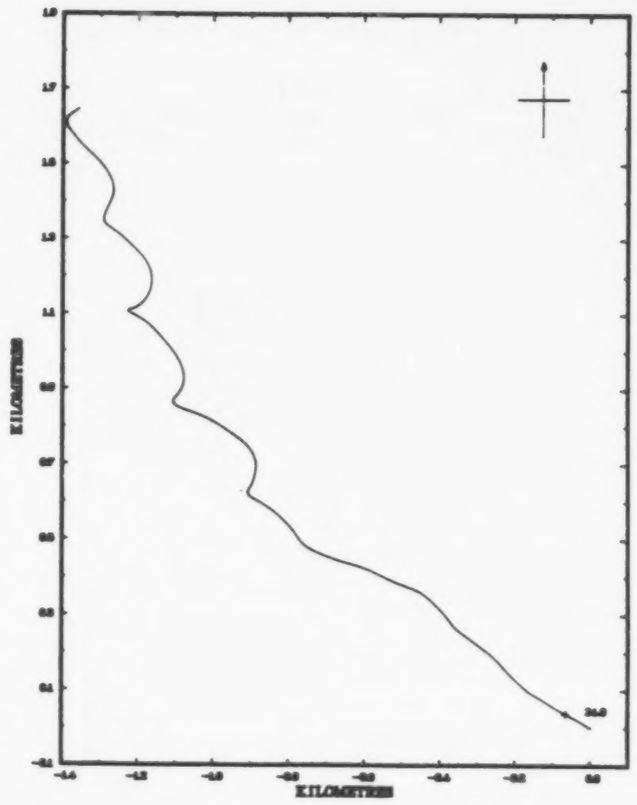


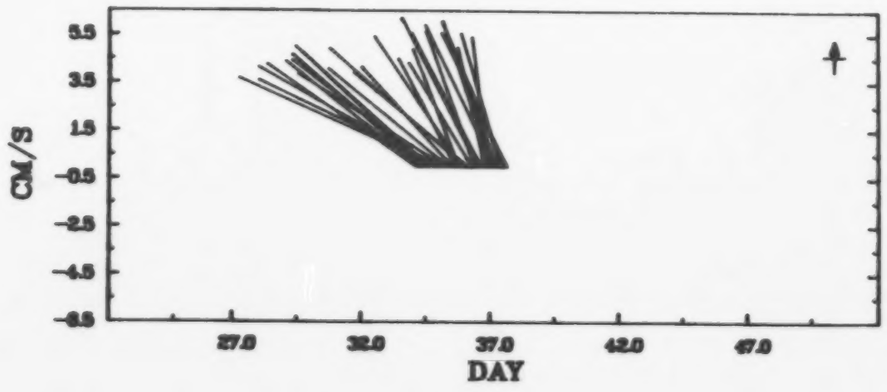


FEB.1-FEB.5 1970

STA.2 3345m

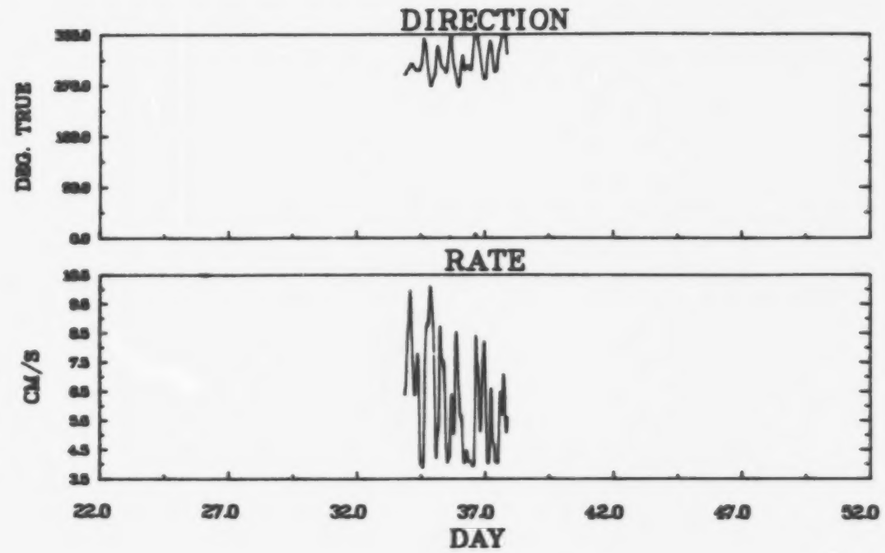


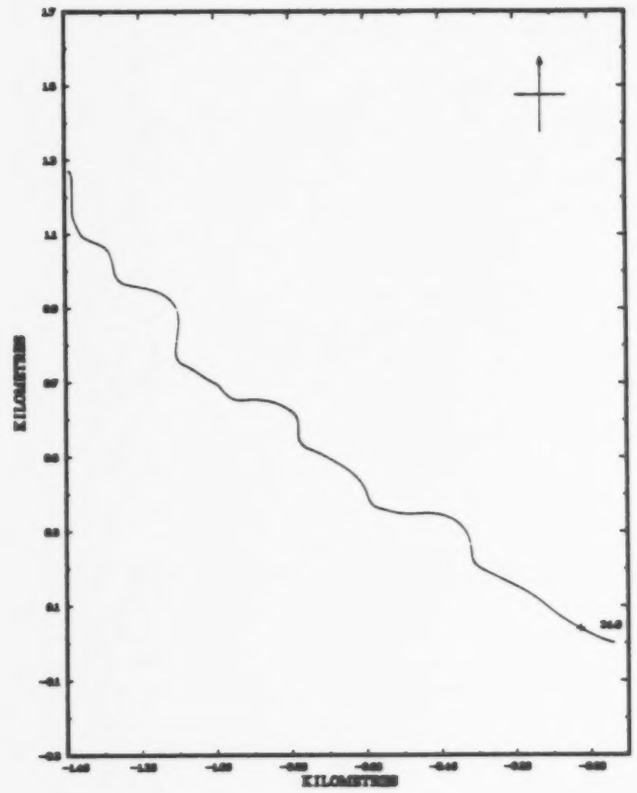


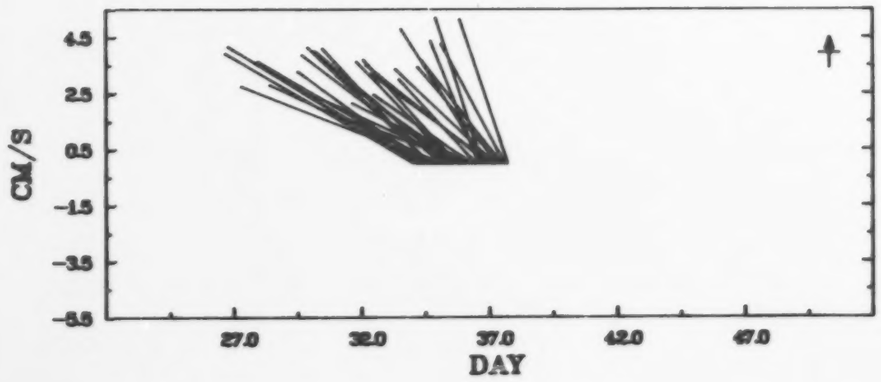


FEB.2-FEB.6 1970

STA.3 150m







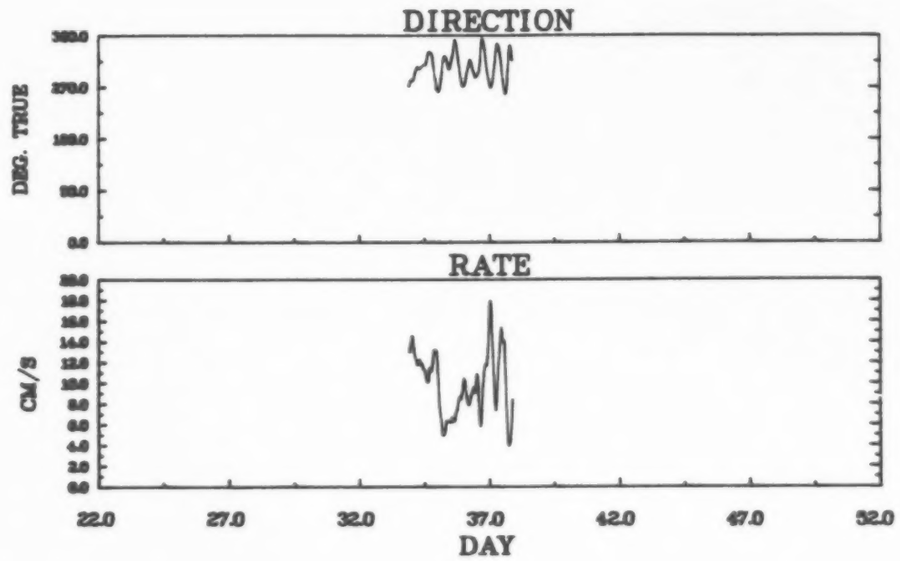
VS DIRECTION

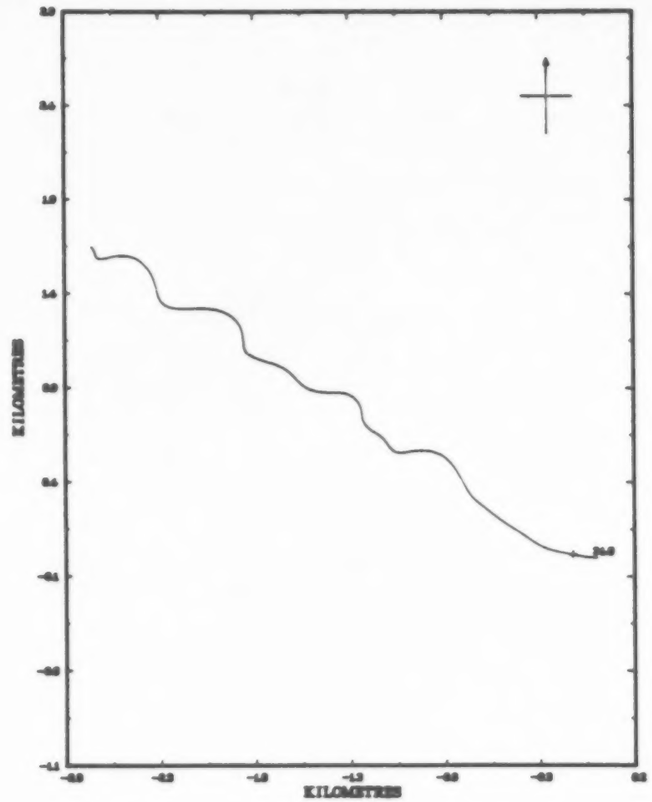
CM/S DEG. TRUE		SUM TOTAL		0 TO 5.00	5 TO 10.00	10 TO 15.00
310.00 TO	330.00	16	*	9.0	7.7	
330.00 TO	340.00	48	*	9.0	7.0	.3
340.00 TO	320.00	68	*	9.4	13.4	1.0
290.00 TO	300.00	101	*	11.0	22.4	1.0
250.00 TO	270.00	30	*	.3	6.7	1.7
240.00 TO	260.00		*			
220.00 TO	240.00		*			
200.00 TO	220.00		*			
190.00 TO	200.00		*			
180.00 TO	190.00		*			
160.00 TO	180.00		*			
150.00 TO	160.00		*			
130.00 TO	140.00		*			
120.00 TO	130.00		*			
90.00 TO	100.00		*			
80.00 TO	90.00		*			
70.00 TO	80.00		*			
60.00 TO	70.00	25	*	.3	6.4	.3
SUB TOTAL		299	0	100	101	33

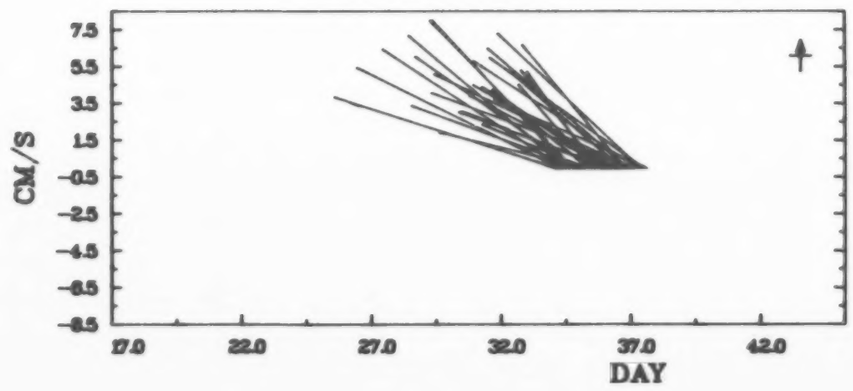
CHAN	NAME	UNIT	NUMBER	MIN	MAX	MEAN	VARIANCE	VARIANCE	STD. DEV.
1	U COMPONENT	CM/S	299	-.10078E+02	.10918E+01	-.42951E+01	-9.307	.139306E+00	.795940E+01
2	V COMPONENT	CM/S	299	-.15998E+01	.13078E+02	.36048E+01	9.191	.854478E+00	.403308E+01

FEB.2-FEB.6 1970

STA.3 1500m







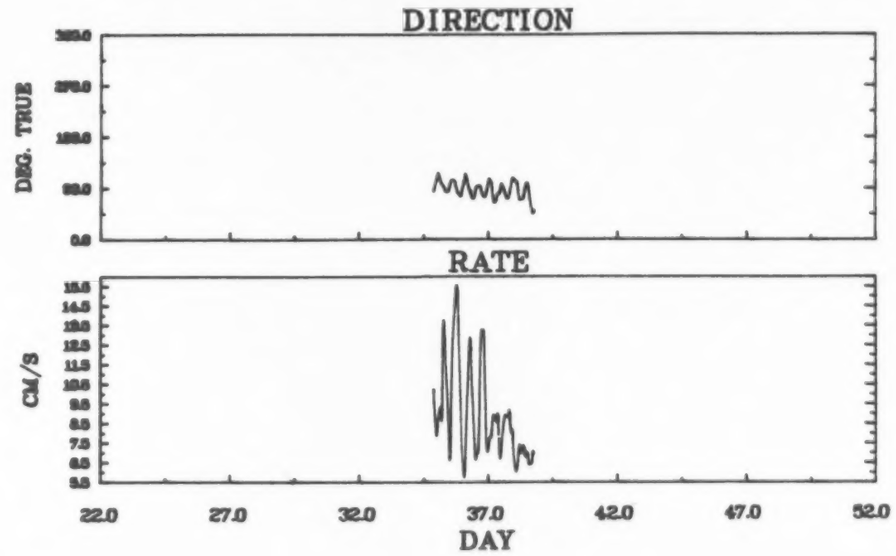
RATE VS DIRECTION

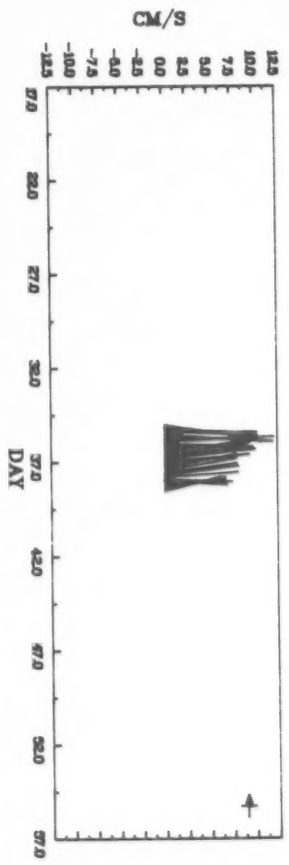
CM/S / DEG. TRUE	300 TOTAL	0° None	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00
340.00 TO 350.00	29	0	1.3	9.1	3.4							
330.00 TO 340.00	52	0	.7	9.1	7.1	.7						
320.00 TO 330.00	64	0	1.3	11.0	12.5	.7						
310.00 TO 320.00	70	0	.7	8.4	13.0	.7						
300.00 TO 310.00	59	0	.3	9.1	10.0	2.4						
290.00 TO 300.00	7	0		1.0	1.3							
SUB TOTAL	297	0	13	226	149	13						

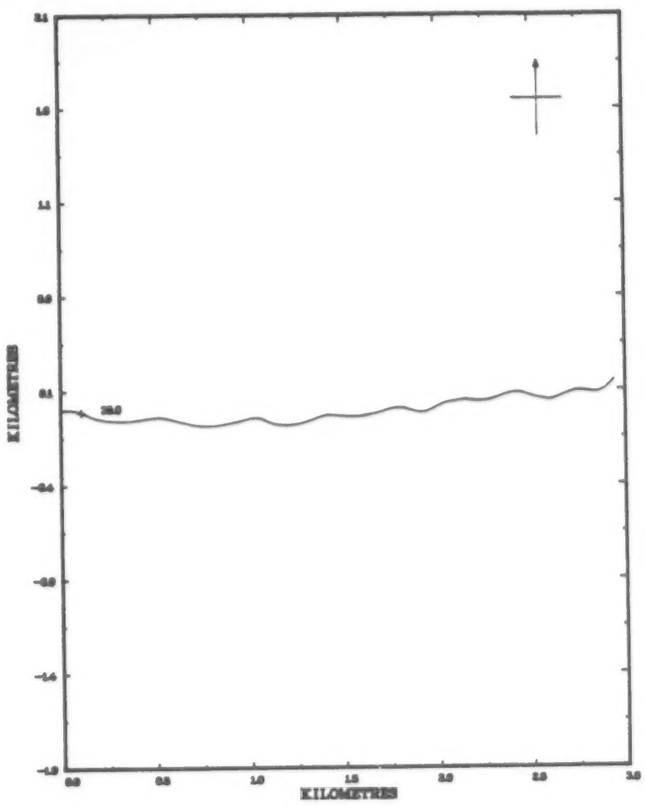
CHAN	NAME	UNIT	NUMBER	MIN	MAX	MEAN	SKEWNESS	KURTOSIS (FROM 0/SEC)	VARIANCE	STD. DEV.
1	U COMPONENT	CM/S	297	-.10706E+02	.69553E+00	-.70209E+01	-0.889	.889998E+00	.35140E+02	.46170E+01
2	V COMPONENT	CM/S	297	-.32140E+01	.13176E+02	.47162E+01	0.686	.899998E+00	.11139E+02	.33636E+01

FEB.2-FEB.6 1970

STA.3 3393m







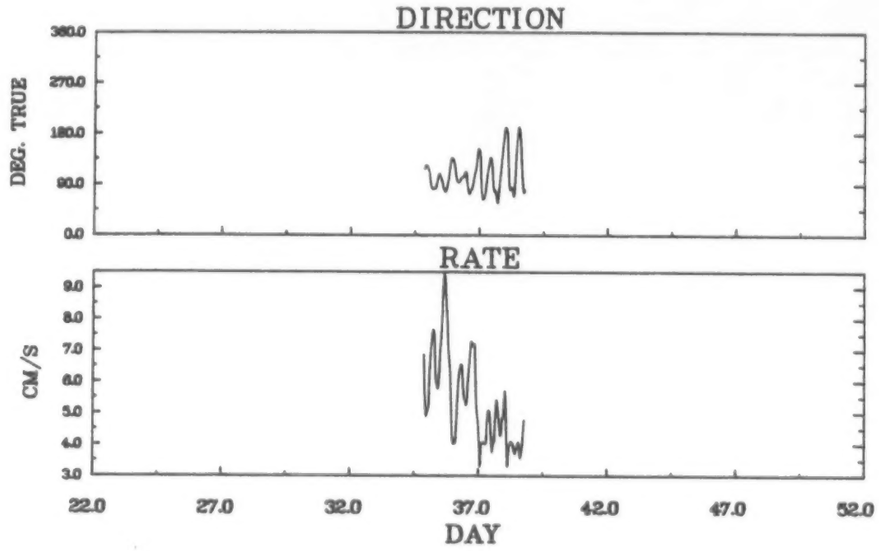
RATE VS DIRECTION

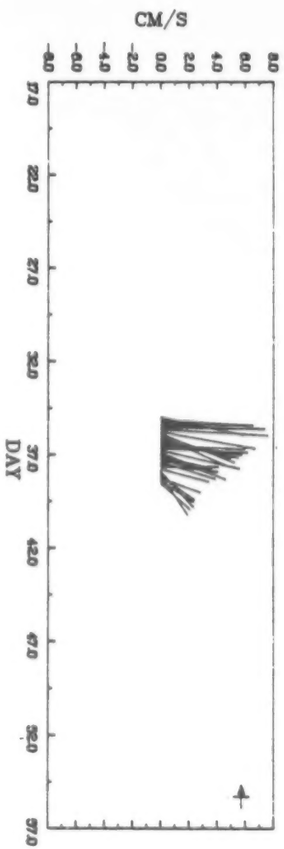
CM/S DEG. TRUE	SAM TOTAL	0.0 TO 5.0	5.0 TO 10.0	10.0 TO 15.0	15.0 TO 20.0
120.00 TO 140.00	3	0	1.0		
100.00 TO 120.00	56	0 .2	19.1	5.0	
80.00 TO 100.00	129	0 .3	39.1	13.7	0.1
60.00 TO 80.00	94	0 .3	29.6	9.2	
40.00 TO 60.00	10	0	3.4		
SAM TOTAL	292	0 1	111	78	6

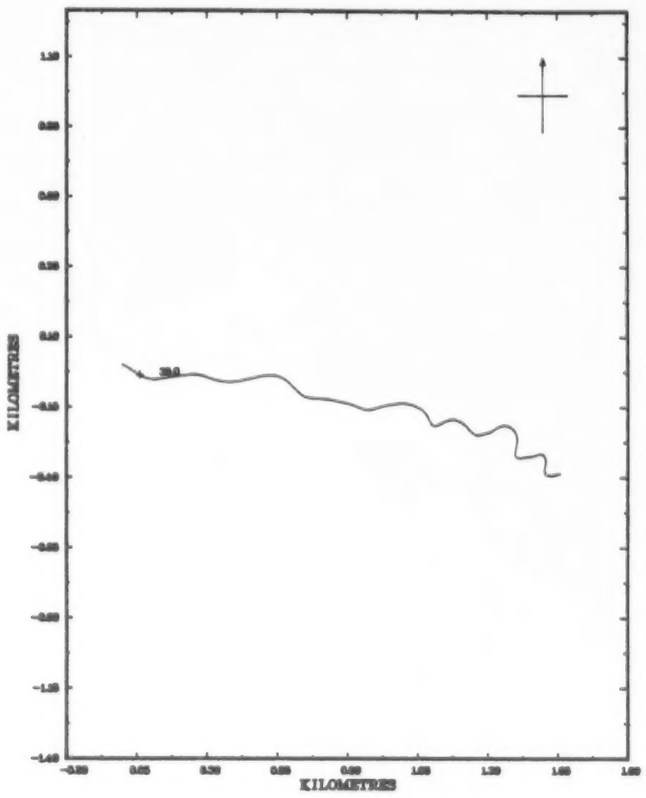
CHAN	NAME	UNIT	NUMBER	MIN	MAX	MEAN	INTERCEPT	SLOPE(/SEC)	VARIANCE	STD. DEV.
1	U COMPONENT	CM/S	292	-.37032E+01	.10431E+02	.61728E+01	11.062	-.133036E-04	.6209136E+01	.2492791E+01
2	V COMPONENT	CM/S	292	-.44226E+01	.30402E+01	.31097E+00	-.749	.716435E-05	.4688041E+01	.2165351E+01

FEB.3-FEB.7 1970

STA.4 150m







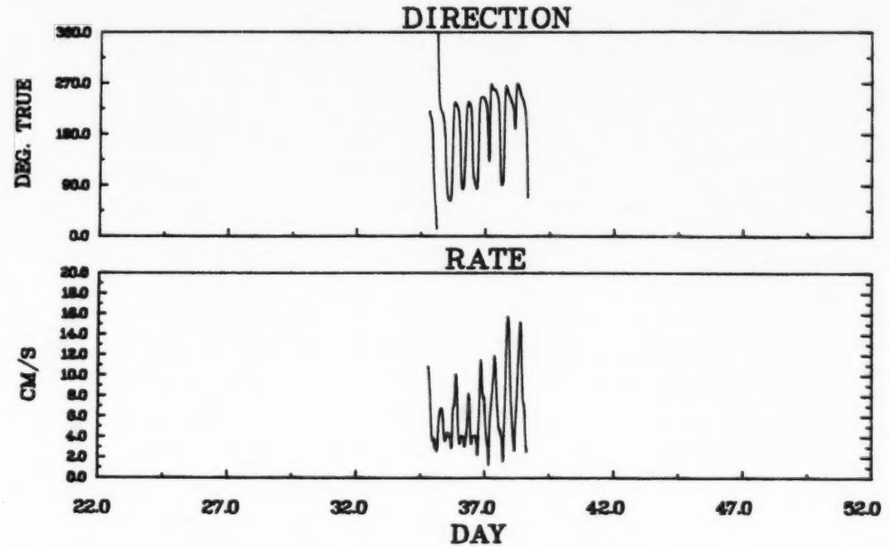
RATE VS DIRECTION

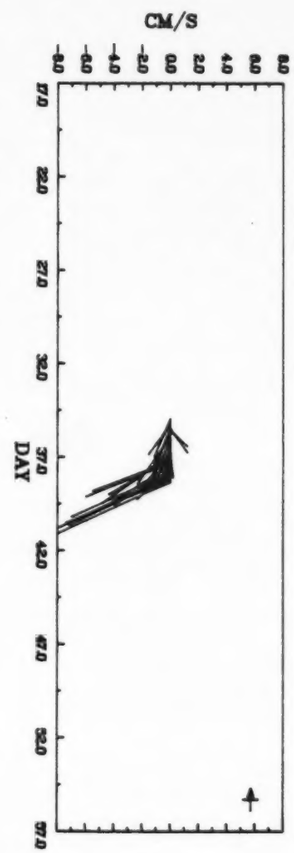
CM/S / DEG. TRUE	SUB TOTAL	WT	RANGE	0 TO 9.9	10 TO 19.9	20 TO 29.9
200.00 TO 220.00	2	*	.7			
180.00 TO 200.00	13	*	2.8	2.4		
160.00 TO 180.00	10	*	2.7	.7		
140.00 TO 160.00	17	*	3.1	2.7		
120.00 TO 140.00	36	*	6.1	6.1		
100.00 TO 120.00	93	*	7.9	21.2		
80.00 TO 100.00	72	*	8.2	16.4		
60.00 TO 80.00	30	*	8.9	7.9	.3	
40.00 TO 60.00	8	*	1.4	1.4		
SUB TOTAL	293	0	120	172	1	

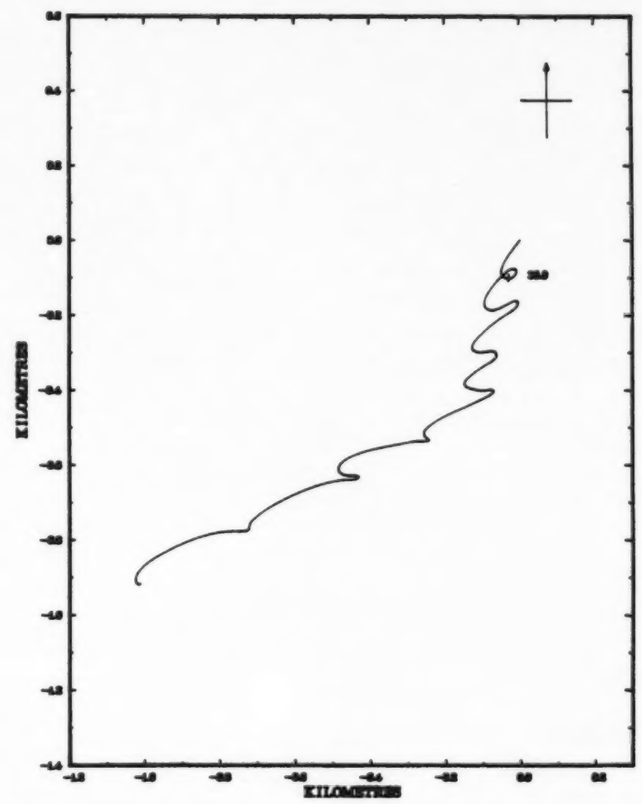
CHAN	NAME	UNIT	NUMBER	MIN	MAX	MEAN	INTERCEPT	TREND(/SEC)	VARIANCE	STD. DEV.
1	U COMPONENT	CM/S	293	-.10178E+01	.90308E+01	.46208E+01	7.000	-.139998E-04	.497108E+01	.222968E+01
2	V COMPONENT	CM/S	293	-.69018E+01	.39908E+01	-.11208E+01	-.990	-.100078E-03	.466958E+01	.215868E+01

FEB.3-FEB.7 1970

STA.4 1500m







RATE VS DIRECTION

CM/S DEG. TRUE		SUB TOTAL	RATE	0.0 TO 9.99	10.0 TO 19.99	20.0 TO 29.99
340.00 TO	360.00	2	.7			
320.00 TO	340.00					
300.00 TO	320.00	2	.7			
280.00 TO	300.00	1	.3			
260.00 TO	280.00	29	2.4	4.2	2.1	
240.00 TO	260.00	36	2.4	4.9	7.3	0.1
220.00 TO	240.00	72	9.8	17.0	4.2	
200.00 TO	220.00	24	.7	6.9	.7	
180.00 TO	200.00	12	1.7	9.4		
160.00 TO	180.00	9	2.0	.3		
140.00 TO	160.00	9	2.4	.7		
120.00 TO	140.00	8	2.4	.3		
100.00 TO	120.00	17	9.6	.3		
80.00 TO	100.00	32	10.8	.3		
60.00 TO	80.00	17	9.6	.3		
40.00 TO	60.00	4	1.4			
20.00 TO	40.00	2	.7			
0.00 TO	20.00	2	.7			
SUM TOTAL		296	0	130	106	41	9

CHAN	NAME	UNIT	NUMBER	MIN	MAX	MEAN	INTERCEPT	TREND(/SEC)	VARIANCE	STD. DEV.
1	U COMPONENT	CM/S	296	-.1572E+02	.9470E+01	-.3887E+01	.114	-.1017E-04	.8109E+02	.9072E+01
2	V COMPONENT	CM/S	296	-.9497E+01	.4806E+01	-.2721E+01	-2.898	.4994E-04	.7892E+01	.2809E+01

FEB.3-FEB.7 1970

STA.4 3352m

POOR

QUALITY

ORIGINAL